

Psychological Bulletin

MILITARY PSYCHOLOGY*

Edited by

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Rutgers University

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MILITARY PSYCHOLOGY

INTRODUCTION

At a meeting in Washington on November 3, 1940, the members of the Emergency Committee in Psychology appointed by the Division of Anthropology and Psychology of the National Research Council proposed the mobilization of psychological knowledge having to do with problems of human engineering in times of national crisis and defense. The first step in this direction was obviously the preparation of some sort of bibliography on military psychology, although it was equally obvious, even to a group of university professors, that historical and bibliographical research can discharge no more than an initial obligation to a country looking for assistance in the preservation of its way of living.

It soon became apparent that the preparation and evaluation within any reasonable length of time of an exhaustive bibliography on military psychology was out of the question. Neither time for careful search, nor space for publication, nor men with leisure to give of their expert assistance could be secured for such a formidable enterprise without going to more trouble than the whole project was worth, or without surrendering the hope that the bibliography might be of use in the present emergency. We were not unaware of the warning that it is later than we think. Even as it is, the appearance of this bibliography is later than we had hoped.

The only solution seemed to be the preparation of a *selected* bibliography, with all the sins of omission and commission that such a procedure inevitably entails. Under the circumstances the editor may perhaps be absolved from the necessity of making any apologies for errors, inconsistencies, overlaps, and idiosyncrasies of judgment on the part of his hard-working collaborators, other than to remind the reader that the following pages were prepared in a hurry, and that they do not purport to bring together exhaustive lists of references.

One of the possible advantages in publishing a selected bibliography on war psychology, in contrast to the more complete lists on file with the Emergency Committee or to the recently acquired Polish bibliography, which Gasiowski started compiling 25 years before the date of publication in 1938, was thought to be its educa-

tional value to large numbers of psychologists in this country who, in all probability, have never given much thought to the relation of psychology to military requirements. We are supposed to be a peace-loving people. It may therefore be assumed that most American psychologists have pursued their professional activities against a background nearly empty of any concern about war. Times are changed, and it may be that more psychologists than we realize will be called upon to change their habits of mind and their topics of research.

The collaborators in this coöperative undertaking have given willingly and faithfully of what time they could spare from other duties. The editor of this journal, Professor McGeoch, has been ready to juggle his other editorial commitments in order to accept the materials for this bibliography at the last uncertain moment and has taken on more than his share of work in seeing the job through. The space which he was able to offer in the *Bulletin* has been increased by the financial assistance of the American Psychological Association.

It soon became apparent that the program within any reasonable horizon is that of an extensive bibliography on military psychology. We are not at the present time in a position to make any statement as to the extent of the program. It is possible that the program will be extended to include other fields of psychology. It is also possible that the program will be limited to the field of military psychology. The program will be determined by the needs of the military and the needs of the psychological community. The program will be determined by the needs of the military and the needs of the psychological community.

The only subject seemed to be the psychology of a soldier. The bibliography with all its limitations and conditions and with its many uncertainties is hereby published. Under the circumstances the editor has been obliged to accept the material as it was submitted. The editor has been obliged to accept the material as it was submitted. The editor has been obliged to accept the material as it was submitted. The editor has been obliged to accept the material as it was submitted.

The date of the present bibliography is published in the *Bulletin* of the American Psychological Association. The date of the present bibliography is published in the *Bulletin* of the American Psychological Association. The date of the present bibliography is published in the *Bulletin* of the American Psychological Association. The date of the present bibliography is published in the *Bulletin* of the American Psychological Association.

ARMY MOTOR TRANSPORT PERSONNEL

BY HARRY R. DeSILVA, PHILLIP ROBINSON, AND
WILLIS H. FRISBEE, JR.

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The selection and training of motor vehicle drivers in the U. S. Army was not much of a problem previous to the present emergency because of the small number of motor vehicles in Army use, the relative stability of the personnel, and the ample time available in which to train such few drivers as were needed. But the present emphasis on motorization and the rapid expansion of personnel have changed this picture entirely. Thus today military units which never before employed motor vehicles, along with newly formed units, are receiving them in large numbers. As a consequence, many thousands of drivers must be quickly selected and trained to operate this new equipment.

SELECTING DRIVERS FOR TRAINING

The Army furnishes a guide for the selection of drivers in its Motor Transport Manual (78) which reads as follows:

An individual selected for training as a motor vehicle driver should be dependable, alert, sober, steady and ambitious, and should have good judgment and mechanical sense. He should be able to drive a motor vehicle satisfactorily under military conditions by day or night. He should react quickly and properly in given test situations. He should be able to differentiate promptly between red, green and amber lights. These tests may all be conducted in the unit.

This paragraph suitably describes the qualifications which it is desirable for a driver to have. Nothing is said, however, about methods of determining whether a driver has these qualifications or not. In consequence, each officer in charge of instruction must use his own judgment as to whether the men selected meet the requirements as outlined. Such a situation is bound to result in standards for selection which vary widely among different units, men with all grades of ability being selected for training.

It has been shown in private commercial vehicle concerns that a standardized system of selection results in fewer failures during the training period and in better driving records following this period. Undoubtedly a system of selection patterned after the best civilian practices in use today and requiring definite standards

of performance on laboratory testing devices as well as on an actual road examination would prove of equal value to the Army in weeding out its potentially less capable drivers.

Unit commanders at present customarily choose as candidates for the training course experienced drivers in preference to inexperienced ones. This task of selection would be greatly facilitated if a routine procedure were worked out for making available to company commanders valid information about the candidate's previous driving record from the appropriate State accident record files. Many investigators have proved that a driver's past record offers a reliable clue as to his future performance (79).

STANDARDIZING DRIVER TRAINING

The training program as outlined in the Basic Field Manual on Motor Transport is sufficiently comprehensive. It is open to question, however, whether under the present conditions of rapid expansion it is possible for company commanders to carry out thoroughly the prescribed course. A survey would seem to be desirable to determine whether the military units concerned can find the time to follow the training program as outlined in the Field Manual.

If as a prerequisite to the issuance of a U. S. Army Motor Vehicle Operator's Permit a rigid examination were administered to each graduate of a company driver-training school by a properly qualified divisional examiner, it might aid considerably in improving the uniformity and thoroughness of the individual training courses and thereby raise the general level of proficiency of Army drivers.

The findings from a systematic analysis of accident records have proven to be of considerable value to commercial fleets in identifying accident-repeaters and in discovering weaknesses in the methods used for selecting and training drivers. The Army would undoubtedly benefit by adopting some similar methods of using accident analysis to investigate the progress of its different units in reducing accidents.

REVIEW OF THE LITERATURE

Literature which pertains directly to the selection and training of military motor transport personnel is practically nonexistent. However, many investigations which have been carried out in the field of civilian driver psychology are applicable to the military problem.

The only outline of the literature on the psychological aspects of driving is by Lawshe (47). There is an older bibliography on the psychology of driving by DeSilva (14) and a good general bibliography on highway safety by Wilson (77).

Few good books touching on the subject of driver psychology are available. The best ones are by Stoeckel, May, and Kirby (69); Vernon (71); and Lahy (40).

The references in the bibliography are grouped as follows:

- (1) Training of drivers
- (2) Detection and treatment of incompetent drivers
- (3) Methods of selecting drivers
 - (a) General articles
 - (b) Medical and psychiatric examinations
 - (c) Visual tests
 - (d) Knowledge and intelligence tests
 - (e) Personality, attitude, and emotion tests
 - (f) Road examinations
 - (g) Coördination and simple and multiple reaction tests

(1) A number of *training courses* have been devised for the training of civilian passenger-car drivers (48) and of bus and truck drivers (24, 70). But such training courses need to be adapted considerably to make them applicable to the Army's specialized equipment and its need to operate under all weather conditions over all sorts of terrain.

(2) Although the literature on training of civilian drivers is of little value when applied to the problem of training Army operators, there are many references on the testing of civilian motorists which are applicable to the problem of selecting Army driving personnel.

No satisfactory composite test or battery of tests has yet been devised which distinguishes clearly between *accident-free and accident-prone drivers* in individual cases. The reason is that most tests measure skill or aptitude, whereas a driver's susceptibility to accidents depends upon a number of other variables which are difficult to control. Thus accident rates vary according to the prevailing speed habits of the driver concerned, his exposure (when, where, and how much he drives), his age, experience, and safety-mindedness. It is difficult for investigators to isolate a group of drivers with accurate accident records whose speed habits, exposure, ages, experiences, and attitudes are comparable. But unless these latter variables are controlled they may be expected to mask the relationship between skill tests and accident records.

Although no one has devised an unassailable technique for dif-

ferentiating between individual accident-free and accident-prone drivers, a number of investigations have been carried out which show measurable differences in the characteristics and performances of groups of these two types of operators (22, 28, 30, 67).

Several investigators have reported a marked lowering of accidents of drivers subsequent to their being subjected to a battery of tests (16, 21, 30, 32). But the validity of such improvement of drivers by tests is questioned (38, 39). Two articles emphasize the importance of a diagnostic interview (20, 57).

(3a) A number of *general articles* are available discussing laboratory methods of analyzing driving ability (1, 3, 5, 25, 27, 44, 45, 46, 50, 51, 52, 55, 56, 68, 74, 82). Other reports outline methods of giving road-driving, law, vision, and road-sign-reading tests (2, 10, 17, 18, 19). The article by Chiappella (11), which was not available to the reviewers, refers to the selection of drivers in the Rumanian Army.

(3b) The Interstate Commerce Commission requires a thorough *physical examination* of all new drivers who come under its jurisdiction (8). The Recorder's Court in Detroit, Michigan, has for many years been administering *psychological and psychiatric examinations* in special cases to traffic offenders (59, 62, 63, 64, 65). The foreign literature also contains references indicating the importance of nervous and mental diseases among automobile drivers (49, 72).

(3c) Although it is universally agreed that *vision* is a most important factor in safe driving, there is no agreement as to what should constitute the minimum visual requirement for driving (7, 13, 58, 66, 75, 80, 81). The American Association of Motor Vehicle Administrators has recently issued a procedure and standards for the administration of a uniform visual acuity examination to all driver license applicants (19). Although normal depth vision is probably of basic importance in driving, experimentation is needed to establish its significance (23, 26, 35).

Several writers have pointed out the important role that night blindness plays in automobile accidents after dark (29, 36, 37, 42). Although a number of devices have been developed to measure adaptation to the dark, time of recovery from glaring lights, and ability to see in the face of glaring lights, little has been done to correlate these three different types of tests and to determine how important normal night vision and normal glare vision are in driving a car after dark.

(3d) The Association of Motor Vehicle Administrators has

prescribed a method for making up and administering a *knowledge test* for use by State motor vehicle departments (19). As for *intelligence*, there is common agreement that a certain amount is necessary to drive an automobile, but estimates vary as to the level required (33, 43, 53).

(3e) A number of authors have emphasized the importance of *personality traits, emotions, and attitudes* in driving automobiles (4, 6, 61, 69, 76), and attempts have been made to devise tests to measure such factors as recklessness and carelessness (9, 73), but so far no completely satisfactory tests have been devised for measuring the "safety-mindedness" of automobile drivers.

(3f) The basic test in use by States to determine whether a person should be accorded the privilege of a driving license is a *road examination* at the wheel of a car. Procedures for rating and scoring a recommended standard State road examination have been issued by the American Association of Motor Vehicle Administrators (18, 19).

(3g) Whereas the road examination will serve to determine whether a person has sufficient training to drive a particular vehicle, it ordinarily does not measure his ability to handle his car in emergencies. Several pieces of apparatus have been devised and studies have been made to measure a driver's *general motor aptitude, particularly his coördination, speed of reaction, and ability to carry on several activities at once* (12, 15, 31, 33, 34, 40, 41, 54, 60). More research is needed to standardize this type of apparatus and to establish its value in the selection of drivers.

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AVIATION

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As a review of the existing knowledge of the psychology of aviation the present paper has a number of limitations. First, it does not include the significant research that has been done in this country in the last year and a half under the auspices of the Committee on Selection and Training of Aircraft Pilots of the National Research Council and the Civil Aeronautics Authority. Secondly, there is good reason to believe that some important work, particularly in Germany and Russia, is not being published. Thirdly, much of the Russian published material, a considerable amount of the Italian, and even some in the more accessible languages could not be examined in time for the present paper. Nevertheless, the writers have in their possession 626 abstracted references¹ that bear upon the psychology of aviation, and 92 of these titles have been selected for mention here.

In general, the psychology of aviation comprises the selection, training, and maintenance of personnel (pilot, crew, and ground staff) and the care and education of passengers. In practice, however, the main body of the literature has dealt almost entirely with two major topics: (a) physiological and psychological effects, immediate and cumulative, of flight and of the flying environment and (b) selection of pilots.

FLIGHT FACTORS

The flight factors studied have been: low barometric pressure (17, 41), decreased partial pressure of oxygen (1, 2, 8, 16, 28, 35, 44, 52, 53, 66, 80, 87), acceleration and centrifugal force (7, 18, 41, 47, 57, 88, 89), vibration (14), temperature (60), as well as such variables as humidity, noise, and light, including ultraviolet and glare (4, 60, 73). The physiological and simple sensory and motor effects investigated (in the main, deleterious) have included changes in circulation (14, 17, 18, 34, 66), respiration and metabolism (16, 28), vision (14, 18, 53, 85, 86, 88), audition (35, 60), tac-

¹ These titles have been selected and abstracted by Razran and are being indexed and prepared for publication under the direction of Brown.

tion (14), kinesthesia (68), static sense² (7, 57, 63), reflexes (14, 87), muscle tension (2, 87), muscular strength (34, 68, 80), and reaction time (14, 68, 80, 87). The psychological and more complex functions affected (again, deleteriously) have come under the headings of attention (68), concentration (68, 87), memory span and mental arithmetic (68, 80, 87), color-naming (8), card-sorting (80), writing (44, 68, 80), manual-work performance (68), affectivity (87), and various test performances (14). Schubert (73) has thoroughly reviewed the physiological factors. Cumulative effects have received such syndrome designations as staleness, neurocirculatory asthenia, pilot asthenia, pilot fatigue, chronic altitude sickness, "mal des aviateurs," and aeroneurosis (4, 73, 92). Their etiology and pathogenesis were reviewed by Perrin de Brichambaut (60). Furthermore, even true neuroses (66, 73, 92) are said to develop from the anxiety states and fears—particularly of falling—in flight, and long-term effects on personality and attitude (4, pp. 447–450) have been cited. After 20 and 200 hours of solo flying, "critical hours" occur: accidents are more probable (45), and dangerous exhibitions may result from feelings of intense exhilaration, power, and freedom (29). Finally, methods used have included: actual flight (28, 41, etc.); mountain acclimatization (34, etc.); simulated flight through such devices as low-pressure chambers (1, 34, 35, etc.), barochambers (17), nitrogen dilution (8, 53), and various rebreather devices (2, 92, etc.); and mechanical oscillator (14). Variables especially studied have been the rate of altitude change (34, 68) and the adaptation and modification of flight effects by the duration and frequency of altitude exposure (17, 28, 34, 57, 60, 63, 67).

Applications of the results lie in attempts to control, avoid, or minimize the effects of flight factors on man by such means as (a) selection and "altitude classification" of pilots by their physiological limit for altitude (44, 92) and acceleration (18); (b) development or maintenance in personnel of an adequate degree of resistance by hygiene and medical care (4, 6, 92) and drugs (1); (c) improvement of plane construction and equipment such as oxygen masks and abdominal belts (88). McFarland (52) finds that the first statistically reliable impairment (6–10%) of psychological functions occurs at 12,000 feet. Marked variations of an individual's resistance to altitude effects are induced by emotionality,

² The effects of flight on the labyrinth and vestibular apparatus have received special and prolonged attention. (For controversies, see 7, 27, 30, 47, 55, 57, 67, 73, 89.)

tension, fatigue, stomach contents, and other factors (73). The tolerance of, and adaptability to, the working environment is thus here a much more important job specification than in most job problems in industrial psychology.³

SELECTION

Early *medical* selection examinations were credited with having reduced accidents significantly (4, 60, 92). So-called "physical efficiency" measures were developed through results of medical examinations, such as the much-used Schneider (cardiovascular) Index (69, 71) and the R.A.F. respiratory tests (70). The acceptance requirements in general were high and predominantly of an *a priori* nature. The vision tests have been particularly severe (4, 92), and in recent years many new tests have been devised for night flying (23, 24, 65). A few validation studies have been made, such as Velhagen's night-field demonstration of the necessity for high color vision standards (84) and Cooper's study of visual defects in relation to progress rate (15), but Ickstadt found the scores of seven of the visual tests to have no relation at all to training school success (37). Parsons (59), as early as 1918, attacked the unvalidated standards of the medical examination as too rigorous, and recently Rook (66) and Brimhall have pointedly re-emphasized the uncritical use of the physical tests. Rook found little difference between the number of flying failures in an English substandard group and in a control standard group. Gemelli has stressed the persistence of a high accident rate (32), and Mashburn has noted that of those applicants who pass the physical examination (20%), 44-87% fail the training course (50).

Psychological selection has been hampered in its test construction by crude criteria since the early part of the first World War. The main criteria have been training school records, mostly graduation *vs.* 'washout' (11, 26, 36, 37, 41, 43, 48, 54, 66, 81), experienced flyers *vs.* nonflyers or students (9, 64, 65, 79), accident *vs.* nonaccident pilots (15, 45, 47, 77, 90), ratings, usually by flight instructors (25, 36, 58, 59, 76), rate of advancement (15) and differential⁴ flying experience (19, 25). The validations have been

³ This is particularly the case in military aviation, which requires much higher altitudes and speeds than does civil aviation.

⁴ Differential ratings of successful experienced pilots are rare. Degrees of difficulty or complexity in different operations (*e.g.* take-off, landing, blind flying) or in different flying assignments (*e.g.* military *vs.* civil, night *vs.* day, high *vs.* low altitude, long *vs.* short flight, type of plane flown) have apparently not been used for the validation of psychological tests.

generally criticized as unsatisfactory (50, 76). Thorndike found the ground school a poor selective agency for success at the front (82). Among the partly validated U. S. tests are the 'startle' tests of emotional stability and free association tests of fear of flying (59); complex reaction time, judgment of speed of moving objects and of extension of parabolic curve (76); mental alertness (81); Henmon's (36) battery—emotional stability, tilt perception, Miles ataxiometer, equilibrium differential, choice reaction, and mental alertness—for which a multiple r of .70 was calculated. From the early reaction-time emphasis (12) developed the "complex coördinators" (92) of Thorne, O'Rourke (48), and Mashburn (4, 49), all of which were partially validated. Analogy tests were devised in Germany (40, 74, 75), Denmark (22), Spain (5), England (Reid's cockpit) (64, 92), and Italy (Carlinga cockpit) (92). Job analyses have been suggested and made by methods of job performance, observation, accident analysis, taking pilots' training course, and questionnaires to pilots, instructors, and passengers (5, 31, 32, 41, 74, 76). Job (trait) specifications thus reached were in general agreement. (For reviews of early European work, see 20, 33, 60, 62.)

Tests for resistance to emotional excitement, aside from the commonly used 'startle' tests (12, 20, 36, 60, 62), have included the PGR (13, 79) and measures of tremor, cardiovascular and respiratory reflexes (20, 36, 51, 60, 61, 62). Rook (66) holds that a weakness of the medical examination lies in the fact that emotions during examination may produce respiratory and cardiovascular changes that will disqualify, while Armstrong (3) apparently considers this to be an advantage and in a way a parallel to the flight situation. Personality traits listed as needed for flying run the gamut from Dockeray's early statement that in the A.E.F. "quiet, methodical men" were the best flyers (19, 20) to a School of Aviation Medicine 1931 list, which included "strong and active instincts of exploration and curiosity" and ability to inhibit the "instincts of self-preservation." The neuropsychiatric section of the U. S. medical examination contains a "personality" study (largely based on Amsden's (42) psychiatric guide) on which several validation studies (training school success and crash records) were made (26, 43, 77). Candidates are classified according to their past reality adjustment mechanism (sublimation, rationalization, projection, etc.) (83) and grouped as cognitive or effective introverts and extraverts (90). Rating scales of weighted neuropsychiatric items have been devised for flying adaptability (10, 72), and

it is claimed (4) that the introduction of the neuropsychiatric examination has reduced the per cent of graduate flyers grounded for nervous disorders from 80% before 1925 (6) to 5% in 1939, and that only 1% of Army Air Corps students now suffer from acute neurosis. On the one hand, reality adjustment ratings were found to have little relation to graduation (54), and, on the other hand, the most important neuropsychiatric findings are said to be predicted by simple tests of psychomotor tension and peripheral circulation (11).

It is really difficult to think of another field of such practical importance as that of the selection of aircraft pilots in which so much confusion reigns and in which research has been attempted and interpreted by investigators of such varying background and training.

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THE CLASSIFICATION OF MILITARY PERSONNEL

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INTRODUCTORY SUMMARY

In attempting to summarize the publications since 1930 and the present status of psychological procedure used in the classification of military personnel, the frame of reference will be a comparison of the German and American methods.

With respect to the assaying of experience, aptitudes, and physique, there is no indication that these countries use particularly divergent methods. Experience is determined by casual interviews and by more formal trade tests. The extent to which these methods are applied is not apparent from the literature, although recent publications indicate that some attempt is made to determine the educational and occupational background of each American inductee. Where some doubt exists as to a soldier's occupational status, an oral trade test is used as a part of the reception center procedure. In measuring skill and aptitudes the Germans lean toward approaches that appear relatively nonverbal, but there is no demonstration that these emphases have proved more diagnostic than American procedures.

With respect to the measurement of intelligence, Germany and the United States have gone in opposite directions: Germany toward the "total personality" and the United States toward independent abilities. No comparison of the adequacy of these divergent approaches is available, since the German reports lack validity studies.

Germany has shown considerably more interest in the evaluation of the personality of officers, noncommissioned officers, and specialists than all the other countries in the world combined if the frequency of publication on the subject is accepted as an index. This activity differs from the American efforts not only in degree but also in kind. The German approach is marked by its subjective nature. While validity data are again lacking, the observation of candidates in standard situations over a period of two or more

days may indeed give estimates equal in accuracy to those provided by many months of acquaintanceship in ordinary life. It is impossible to make a detailed evaluation of the German procedures for the study of personality, since no part scores are given. This lack of analysis has a twofold effect. It keeps such questionable procedures as the analysis of handwriting and of facial features from interfering with the sensible judgments from other sources; but it also prevents a rational removal of the inefficient predictors. The German characterological approach does not necessarily exclude a reliable and valid system of personality measurement, but it probably retards the development of the most efficient methods.

It seems fair to say that, as in industrial psychology, the chief difficulty running through all military classification procedures is the inadequacy of the available criteria. How can the success of a soldier be measured? And until his success is determined for his many specialities, how will it be possible to know whether he was the right man for the job?

The articles have been summarized according to the various aspects of the soldier's behavior which have been investigated. Under the first heading, *physical examinations*, which includes tests of strength, there is little of importance to be reported.

The first important study of the *experience* of the soldier was made during the World War by the Committee on Classification of Personnel in the Army (13). In general, the only materials prior to 1930 which are reviewed are the reports on the American World War work, which forms the basis of much of the later work. Nass (49) and Masuhr (41) give interesting accounts of the use of personal data in relation to the prediction of military aptitude. Simoneit, in his book, *Wehrpsychologie* (60), outlines the use of the life history in the selection of German officer candidates. This book and an unpublished report by Martin (40) are valuable sources on all phases of the German work; they enter into all the other sections also.

In the next section, *intelligence tests*, the World War work is given in Volume XV of the *Memoirs of the National Academy of Sciences* (52). Anderberg (2), Forlano and Watson (20), and Harrell and Faubion (23, 24) report statistical studies in which positive results were found. The *Fortune* article (6) gives a popular account of the present United States Army testing program. Wohlfahrt (68) and Zilian (75) supplement Simoneit and Martin on the German viewpoint on intelligence.

Of the many *aptitude* studies, those reporting results are by

Giurca (22) on military cadets, Harrell and Faubion (23, 24) on airplane mechanic students, Mühl-Kühner (46, 47) on army couriers, and Donat (16, 17) on radio telegraphists and anti-aircraft artillerists. Seashore and Adams (59) and Humphreys, Buxton, and Taylor (30) present material on the relation of steadiness to marksmanship. Lubrich (39), Simoneit (60), and Martin (40) report the German view.

There are few studies on *interests*; that of Wohlfahrt (69) represents the use of interests as indicative of temperamental differences. Most of the work on *personality* is German (40, 53, 60, 62); Forlano and Watson (20) report personality differences between R. O. T. C. sergeants and privates.

Several references do not fall under any of the topical heads. Three references deal with the work of several countries. Of these, Hopkins (27) says that he saw in Berlin the central test station for 15 psychological laboratories where 84 military psychologists were employed; he also visited Hungary. Zielasko (74) has summarized psychological methods of selection in various armies. The third review is by Banissoni (8). The articles by Alberini (1) and Dodge (15) are too general to pigeonhole. Gasiorowski's bibliography of army psychology (21), published in Warsaw in 1938, is often mentioned, but not until recently has a copy been seen in the United States. In that bibliography, containing 6382 items, the German literature has furnished the largest number of items; then follow French, Russian, English, Polish, Italian, and other literatures in succession. An Italian review (8) states that many of the Gasiorowski references are nonmilitary, which must be true. The distribution of titles in the present paper, arranged by the country in which the work was done, is Germany, 38; the United States, 17; Belgium, 5; Rumania, 4; Italy, England, and France, 2 each; Sweden, Switzerland, Poland, China, and Spain, 1 each.

PHYSICAL EXAMINATION

The selection of military personnel depends traditionally on a physical examination, which no doubt the regulations of practically all armies include, but the military and psychological periodicals have little to say on the subject. In discussing the battery of tests which is given on certain days each year to volunteers before their induction, Hesse (25) mentions tests of strength as well as of accident reactions and of taking an electric shock. The results of these tests may be considered in the light of the personality manifestations rather than of the actual strength exhibited.

Mira (44) refers to muscular strength tests, as well as to those of emotional control, rapidity of visuomotor reaction, and accurate perception of distance in choosing antitank troops. Only one man in 250 could pass the series.

EXPERIENCE

The topical heading, experience, will include personal, educational, and occupational experience, whether obtained from a formal test or otherwise.

The work of the Committee on Classification of Personnel in the Army (13) in developing trade tests and the soldier's qualification card during the World War is well known. *Trade tests*, by Chapman (12), lists a number of these tests. The outstanding German use of trade tests at the same period was the tests of truck drivers developed by Moede (45), which, according to Martin (40), permitted the training period of truck drivers to be sharply decreased.

Several trade or practical tests have been referred to for various army jobs. Leseul (36) mentions practical tests that were given to field mortar, field gun, and machine gun crews and surveyors. Donat (17) refers to a short written test in the selection of antiaircraft artillerists, which presumably depends on experience for the answers. Kreipe (35) includes practical technical tests along with reaction times to visual and auditory stimuli and perception tests for listeners, signalers, and distance estimators. Wirth (67) describes a study in which success on a practice device using blank cartridges and electromagnetic registration of the shots on a target correlated with free shooting as follows: .57 for 8 students, .70 for 9, .69 for 27.

The question of psychological-sociological statistics, especially regional differences, is discussed by Nass (49, 50) and by Masuhr (41, 43). Nass (49) reports that soldiers from hilly and mountainous country were more successful military surveyors than those from the lowlands. Müller (48) obtained contrary results; Odenthal (54) also disagrees with Nass. Nass (49) further reports that education was associated with suitability and that skilled tradesmen showed no ability as surveyors. The race question was raised but not answered. According to Nass, the most important influence was geopsychic.

Harrell and Faubion (23) state that graduation from high school or the "equivalent" is required, as well as a minimum grade in Army Alpha and Shop Mathematics, for entrance into the United

States Air Corps Technical Schools, which train aviation maintenance men.

According to Hopkins (27), 40,000 candidates for specialist positions in the German Army were given vocational tests during one year. Life history is one of the four analyses used in selecting German officers, according to Simoneit (60, 61, 62) and others (35, 39, 53). Zielasko (74) briefly mentions experience in a 1938 review of psychological methods of selection in various armies. Psychotechnical tests for specialists, following the German models, are reported in Estonia, Austria, Switzerland, and Czechoslovakia and in Italian aviation. An analysis of the life history was also made in Holland.

In spite of the widespread use of the life history, there is nowhere convincing proof of its optimal use; that is, no attempt has been made to use the most effective system of weighting items such as has been done in the case of selecting insurance agents.

INTELLIGENCE TESTS

The Army Alpha and Army Beta tests are described in the "Report of the Psychology Committee of the National Research Council" by Yerkes (71), in *Army mental tests* by Yoakum and Yerkes (73), and in the *Memoirs of the National Academy of Sciences*, Vol. XV (52). That these tests marked the beginning of large-scale mental testing is well known. What is not so well known is exactly to what military use Alpha was put. It was used largely on a permissive basis after the first tryout; that is, organization commanders had the choice of whether or not they would use the results, and if so, to what extent. It was demonstrated that Alpha could be useful in (1) selecting men for officers' training and for noncommissioned officers; (2) picking out men for discharge, for labor battalions, or for special training battalions; (3) balancing units according to test scores; (4) picking out training groups homogeneous as to tested intelligence. Among the interesting, but not so practical, results was the demonstration of significant test differences according to occupation, home state, country of origin, and schooling.

A number of studies have followed in which either the tests or methods employed were similar to those used by the U. S. Army psychologists. Stearns (65) reports the independent classification of United States sailors in the World War according to a mental test. Duckwall (19) cites a correlation coefficient of .69 between ratings taken from the efficiency reports of 109 United States

officers and a Thorndike Mental Alertness Test. Leseul (36, 37) and Yernaux (72) describe the application of an adaptation of Alpha to Belgian recruits for equalizing units in tested ability and for arranging training groups equal in learning speed. Atanasiu (7) writes a general discussion on the measurement of intelligence and of ability, addressed to the Rumanian Army.

Anderberg (2) correlated point scores and time scores on an intelligence test with practical and theoretical course marks given in recruit training in the Swedish Navy. The correlations were significantly positive. In selection, the tests are used mainly to set minimum requirements. Comparisons are made between the following groups: those who went to elementary schools and those who went to higher schools; men from the country and men from the city; men whose fathers were unskilled and those whose fathers were skilled.

Forlano and Watson (20) found in a study of United States R. O. T. C. students that student sergeants were probably significantly more intelligent than student privates and corporals. The difference in intelligence scores between a group electing military science and a group not electing it was not significant. Similarly, the difference between groups high and low in military science marks was not significant for intelligence test scores.

Harrell and Faubion (23, 24) report a correlation of .22 between Alpha and composite grades in basic airplane mechanics courses for 84 soldiers who had been previously selected on the basis of a minimum Alpha score. In a similar study the same investigators found a correlation of .45 for 105 soldiers.

Donat (17) studied the selection of antiaircraft artillerists in the French Army. Ranks on attention, memory, and intelligence tests correlated .77 with instructors' ranks for 22 men. These tests were suggested from a job analysis to supplement visual and auditory acuity tests, information from questionnaires, a written test, and instructors' advice.

Giurca (22) studied the intelligence as well as other traits of cadets in a Rumanian military school. Piret (55) refers to Army tests in Belgium in connection with the level of recruits grouped according to occupational background. Hsiao (29) reports correlations of .52 and .50 between an intelligence test and the military course records of Chinese soldiers.

In the above studies, the possibilities and limitations of applying such tests as Army Alpha are shown fairly clearly, although its actual use is far from definite since it is not possible to know how

much military use the published reports reflect. Significant correlations are the rule between test scores and training course grades. Test scores, in addition to being used for the selection of men for special training, are also used for balancing units and for making units homogeneous in learning speed.

Carrard (11) reports an examination aiming at testing intelligence, character, and perceptions and reactions, used in the Swiss Army for selecting men in the Air Corps and a few officers in the auto service and cavalry.

Banisoni (8) writes that little new work has been done in Italy since the World War. In Russia (8, 74), tests of memory, attention, capacity for executing orders and coördinating ideas were used in the classification of soldiers.

According to a recent article in *Fortune* (6), the United States Army is substituting a General Classification Test for Army Alpha. Its purposes will be practically the same; and the abilities represented will probably be similar, although the test's appearance is different. It is made up of arithmetic, box counting, and vocabulary items, to represent numerical, reasoning, spatial, and verbal abilities.

The German point of view in the study of intelligence differs from the American one. Zilian (75) writes that in military life character is placed before intelligence in the selection of German officers and specialists. Intelligence testing should therefore be characterological and qualitative rather than quantitative. Simon-eit (60) writes that isolated measures of single abilities are useless. In German military psychology, the analysis of language, which emphasizes choice of words and sentence form and connection, overlaps the mental analysis. The mental analysis, previously called an intelligence test, consists of a series of tasks and an interview so arranged as to be confirmed by the action analysis. It affords an opportunity not only to give an intelligence score but also to reveal the drive and the direction of thought, its method, its relation to other mental abilities, and its place in the whole personality. In giving the test, the aim is not to tap single, isolated mental functions but to afford a chance for free mental work of a complex sort. Tasks are given which will display the individualities of different candidates and call into play such different factors as concepts, judgments, conclusions, depth of thinking, combinations, and comprehension. Attention and memory tests are given first to orient the examiner to the analysis of these mental tasks. Two chief types of tasks are included: purely intellectual

tasks and those in which the candidate's values are important. To complete the findings of the test, an interview takes place in which the candidate gives a picture of his mental organization, expressing himself on his past and his future, his attitude toward intellectual things, his self-judgment, and his goals.

Zilian (75) says intelligence can be tested through the formation of relations. A performance test is mentioned in which, instead of naming the relations, the subject continues certain series of them. There are 32 experimental sets organized in several categories; within each category there are only two extremes. In testing, the examiner starts a regular series and then has the candidate continue it.

Martin (40) reports some additional details on this test of practical intelligence. He says that the objects in a series differ according to size, large and small; weight, light and heavy; surface, rough and smooth; shape, straight and curved; and color of the edges, red and blue. The material provides possibilities for many different arrangements of varying difficulty. It is apparent that the test requires abstraction without penalizing those who are inept in verbal formulation. He gives some additional details on the German work. Although the tests are chiefly individual, it is asserted that paper-and-pencil tests are given to groups. In a three-word test, the examinee is requested to compose a story using three given words. The degree of imagination expressed, the type of story, and its logical and coherent structure are some of the aspects assessed.

Wohlfahrt (68) writes that the German military psychologist is not interested in traditional intelligence testing. He wants not only to investigate the candidate's behavior in practical situations, his ability to learn from past experience, and his ability to coördinate and to order his past experience but also to know his memory, his ability to judge cultural influences, his values, his outlook on life, and his achievements. This broader definition of intelligence is also said to lead to more easily observable and verifiable symptoms. For example, a study is made of the impulsiveness, the order, and the egocentricity of the thinking process.

The German work is strikingly different from the American approach in that intelligence tests merge with personality tests. It is not possible to evaluate their effectiveness, since the German literature is extremely scanty in validity studies, apparently being satisfied with surface validity. The German objectives, however, make good reading, and the majority of American psychologists

would agree with them, their only question being whether or not the objectives were achieved. The German objectives were in line with their need before the war to select personnel carefully in order to develop a leader army ready for expansion in case of war.

APTITUDES

From one point of view, all selection and classification devices purport to be indicators of aptitude. For convenience in exposition, however, this section treats only of aptitude tests not found under the other headings of physical examinations, experience, interests, intelligence, and personality. This means that the aptitude tests range on the one hand from the abilities, treated analytically, that make up intelligence tests to reaction time and steadiness on the other. The majority of the studies do have a unity of purpose, namely: the testing of the abilities needed in learning to be technical military specialists.

Several writers have taken up the question of aptitude testing in a general fashion. Lubrich (39) writes that one reason for utilizing natural talent is to increase the soldiers' "joy in service." In choosing specialists, a knowledge of the total personality is necessary in addition to the knowledge that the listener needs good auditory powers combined with a long span of attention; that range-finders need visual ability; that radio operators need concentration, self-discipline, and the ability to hear rhythmic patterns. Another writer to propose aptitude tests is Drake (18), who specifies that people who handle mechanisms should be chosen on the basis of perceptual ability and that eye-hand coordination is needed in aiming and firing. Kreipe (31) has mentioned the desirability of examinations for sight and hearing for certain posts.

A number of reports describe experimental approaches to the use of aptitude measures in choosing soldiers for various duties. Giurca (22), in reference to entrance to a Rumanian military school and to the guidance of cadets to branches of the service, mentions aptitudes, measurements of which are unspecified.

Harrell and Faubion (23) found a multiple correlation of .72 between a composite grade and four pencil-and-paper tests for 84 student airplane mechanics. The tests were largely of spatial relations. The same investigators (24) found a multiple correlation of .63 between four factors, verbal, space, induction, and reasoning, and a similar composite grade for 105 trainees. When the soldiers were compared with students, Hyde Park High School seniors had higher perceptual, verbal, and induction scores; Air Corps Techni-

cal School men had higher reasoning and space scores. The differences for number and for memory were insignificant.

The *army courier* is another army specialist whose aptitudes have been tested. Mühl-Kühner (46, 47) describes a German study in which 18 riflemen were ranked as to their courier ability by their company commander. This criterion gave a rank order coefficient of correlation of .87 with an average of the three following tests: memory for logical context, combination ability (and quickness of apprehension), and visual memory (and observation). Six additional tests, Marbe's counting table, sound localization, letter cancellation, smell, alternation of perception, and the interpretation of noises according to their sources, also correlated positively, but less highly, with the criterion than the three mentioned above.

Radio aptitudes have been discussed and investigated by several persons. Dietsch (14) has maintained that radio aptitude is based on three things: initial interest in the work, ability for acoustic comprehension and differentiation, and intellectual capacity for invention. In the psychological testing for radio aptitude, therefore, possibilities for development, liking for the job despite loud, discordant noises, and possibilities for adaptation must be investigated. How to use this approach experimentally is not specified. Kreipe (33) states that tests have shown that there is no relation between ability in radio work and in differentiation of pitch, of length of tone, and of intensity, but that concentration and low distractibility are important. Ability to distinguish auditory rhythms may also be important. In another article, Kreipe (35) mentions practical technical tests, reaction time to visual and auditory stimuli, and perception tests given signalers, listeners, and distance estimators. Donat (16) has described a study with radio men. Optometric tests for visual acuity, the watch test for auditory acuity, a medical examination, a short written test of dictation and calculation for primary school knowledge, and an interview for interests were the individual tests given 50 soldiers. Those who passed the individual tests took the group tests. The first was one of rapid dictation of a given text in two and one-half minutes. The second test consisted of representing long and short sounds by long and short marks. This test, incidentally, is probably the most widely used type for "code learning." One letter counting and three memory tests were also used. Subjects were classified as "fit" or "unfit." Different weights were given the tests for radio men on the one hand and for telephonists and signalers on the other. The criterion of success was reaching a recep-

tion speed of 10 words per minute for radio men and instructors' judgments for telephonists and signalers. For radio telegraphers, the test and the criterion ratings agreed in 25 cases and disagreed in 9 cases. For telephonists and signalers, the ratings and the tests agreed in 27 out of 34 cases. Since the customary percentage of failures is quite high and since the tests predicted 13 of 16 and 8 of 11 failures, the results seem promising.

Donat (17), reporting the selection of *antiaircraft artillerists* in the French Army, gives results in which ranks on attention, memory, and intelligence tests correlated .77 with instructors' ranks for 22 men. These tests were suggested by a job analysis to supplement visual and auditory acuity tests, information from questionnaires, a written test, and instructors' advice.

Leseul (36, 37) has written of aptitude examinations for establishing Belgian *infantry units*. Field mortar, field gun, and machine gun crews were given practical tests which seem to be on the borderline between aptitude and trade tests.

Four studies have been found concerning the prediction of *marksmanship*. Seashore and Adams (59) refer to an article by Spaeth and Dunham in which the latter investigators obtained a correlation of .61 between thrusting steadiness and target score for 60 Army marksmen. Seashore and Adams themselves developed an improved steadiness apparatus, which showed six members of a rifle team to be superior to an unselected group. Humphreys, Buxton, and Taylor (30) say that marksmanship can be predicted on the basis of steadiness. Rifle steadiness was the most valid of four tests tried. As we have already reported, Wirth (67), in an experiment with German students, found success on a practice device to correlate satisfactorily with free shooting. Banister (9) reports tests of (1) consistency in pointing with the hand at various targets when the hand could not be seen, (2) ability to press the trigger without jerking or rotating the hand, and (3) determination of the dominant eye to be diagnostic of marksmanship and soldierliness in English soldiers. He emphasizes tests of eye dominance particularly, reporting a significant relationship between right eye dominance and good marksmanship in spite of a poor criterion measure.

It is not clear that any of the above tests have actually been used in the classification of military personnel. Several reports do mention the use of aptitude tests, but these are almost entirely lacking in demonstrations of the validity of the procedures. Perhaps rigorous studies have been made and not reported, or perhaps

sufficient experience has made formal statistical studies unnecessary.

Still other reports describe the use of aptitude tests with no reference whatsoever to any validation. Mira (44) refers to *anti-tank tests* composed of rapidity of visuomotor reaction and accurate perception of distance as well as to tests for muscular strength and emotional control. Visual, auditory, and attention tests were tried for scouts by the Spanish government in the Spanish War. Hesse (25) mentions accident reactions among the test battery for German inductees. Zielasko (74) reports industrial aptitude tests in use by the Russian Army and psychotechnical tests, which are probably partly aptitude measures, as being used in Russia, Estonia, Italian aviation, Portugal, Switzerland, Czechoslovakia, and Germany. No detailed description is given of any of the tests.

Kreipe (32, 34) mentions that German *surveyors* are selected in part on the basis of aptitude tests. German military psychologists, in addition to possessing methods of measuring character, also use tests of eye-hand coördination and spatial orientation in the selection of *tank drivers*, according to Nass (51). It would be interesting to know the relation of the spatial orientation test to those of spatial relations which are valid for mechanics. Carrard (11) reports that an individual test was used in the Swiss Army Air Corps, for a few officers in the auto service and cavalry and for a few noncommissioned officers. The examination aimed at perceptions and reactions as well as at intelligence and character.

A recent *Fortune* article (6) states that the United States Army is using paper-and-pencil mechanical and clerical aptitude tests for the classification of men. Brigham (10) has made studies of the scholastic aptitude of West Point and Annapolis cadets and has consistently found positive predictors although these predictors have not been used.

The most detailed description of German aptitude tests is found in the Martin report (40), the accuracy of which is not known. In general, it is consistent with the accounts of the program from official sources, although a few details appear to be inaccurate. Manual dexterity tests have the practical appearance of work samples, which is consonant with the German program of testing. Men delegated for the various special weapons and distinct types of services take aptitude tests as well as sample work under conditions of stress. Many of the former tests have been successfully employed for selecting workers of a similar type in industry. As more numerous and specialized weapons have been

introduced into the Army, so more numerous and specialized tests have had to be developed to select technical personnel. Some of these tests, those for transport drivers, could be absorbed ready-made from extant industrial tests. Others, such as those for U-boat listeners, had been already developed in the last war and have been further improved and extended for use in the antiaircraft section.

A follow-up of those successful in the psychological aptitude tests is also made, as in the case of the examination for officers. Once a test has passed beyond the experimental stage, failures are as infrequent in the specialists corps as in the officers corps.

This brief paragraph is practically all that Martin writes of the validity of the extensive German testing program. Neither is there much additional reference to validity in the other articles dealing with the German program.

Schmidt (58), in one of the few German studies quoting validity figures, states that in one group of officer candidates, unspecified as to year and branch, of those dismissed from the army, eight had been called unsuitable, two conditionally suitable, and only one suitable on the psychological examination. Obviously this small sample is likely to be unstable.

Martin (40) and others (25, 26, 53, 60) report work sample tests for candidates for officers' commissions in the Germany Army. Their aptitude testing, both for specialists and for officers, incidentally, is more similar to American techniques than is true in the fields of personality evaluation and of intelligence testing. Examples of technical tests for officers follow:

In the water supply test, different problems are to be solved by making use of a diagram of a complicated system of pipes and conduits. The places where the pipes intersect are left blank in the diagram. The examinee is required to affix appropriate discs on which are represented various types of joints, namely, straight, T-shaped and elbow joints, so that the supply of water be directed to specified points in the plan.

Another test is one of map-reading. It attempts to assess the capacity to visualize concrete objects represented on a map. Previous training in map reading is not required. Indeed, such special knowledge and experience is taken into account against the candidate in assessing his score.

The military work samples are the "command series" and the "leader test," described more fully in the section on personality tests. Hopkins (27) gives an interesting account of a work sample for Hungarian officers which he saw. (The Hungarian work is patterned on the German.) In a hall like a gymnasium, with material lying around, two officers were examining a candidate for a com-

mission. He was to instruct three men in the use of the material in building a bridge. First, he told the officers his plan for instruction; then he summoned the men and gave orders and supervised their work.

While the above references indicate that a number of studies and applications have been made of aptitude tests in classifying military personnel, judging by the reports the programs have been sketchy. In no instance is there an ideal study consisting of job analysis, tentative battery, validity study, and final predictive battery. Some writers give the appearance of naïveté in apparently being convinced that acuity and attention differences account for individual differences in performance. While such hypotheses might in some instances be correct, it would certainly seem necessary to check them before actually using the tests.

INTERESTS

Only two studies of interests related to the classification of military personnel were found. No doubt interests are often considered in the placement of soldiers or sailors. For example, according to an article in *Collier's* on the new United States Army Qualification Card, there is a space for recording what duty the recruit wants. Less formal, but equally effective, uses of desires are probably utilized frequently.

Giurca (22) used profiles from measures of interests, intelligence, mental function, instincts, emotions, temperament, introversion-extroversion, aptitudes, and emotional stability for the placement of Rumanian cadets in a branch of the service. Profiles showed only 4 out of 40 cadets desiring a branch for which they were not fitted. How the desirability of particular profiles is arrived at and what tests are used are not given.

Group statistics concerning the question of temperament and interests are furnished in a study of German officers by Wohlfahrt (69, 70). An interest questionnaire, which is a German translation of the Strong blank, is analyzed for 750 candidates who were selected as officers on the basis of the remaining psychological tests and 600 who were rejected on the same basis. The group selected as officers was composed of 150 candidates each from Berlin, middle Germany, Westphalia, northern Germany, and southern Germany. No differences between these geographical groups were found. The 600 rejected candidates included 150 rejected for temperamental weakness, 150 for introversion and egocentricity, 150 for lack of poise, and 150 for lack of will power. Other

bases for rejection occurred too infrequently to be included. The percentage of "like" responses on the interest blank is considered for each group. On items pertaining to school subjects, amusements, and occupations, the rejected candidates like practical activities and subjects more, and cultural activities and subjects less, than do those selected. (These and other differences in this study, although probably significant between groups, are of questionable usefulness in the case of individual officers.) This is hardly in keeping with the stereotype of German officers, but it does agree with other German publications on the ideal German officer. On sport items, the rejected are more interested in passive, and less interested in active, sports than are the selected candidates. When those items dealing with personality characteristics and social situations are considered, the rejected show a greater preference for those items indicating lesser self-confidence and extroversion and a greater desire for security. They show a greater preference than do the selected for occupations which are routine, demand little social participation, and offer economic security. Mercantile occupations seem most preferred by the rejected candidates. The temperamentally weak group shows a below-average preference for all types of items; they also use 12% more "indifferent" responses than do the other groups. The group with social difficulties prefers the artistic, literary, professional, and amusement items above the average, but shows a below-average liking for technical items; while in relation to sports and amusements they prefer those that are solitary or which allow them to exhibit cleverness. The group lacking poise shows above-average preferences for all items except the professional ones, to which their response is average; their responses to all items indicate a low and narrow cultural level. The group characterized by lack of will power does not manifest clear-cut behavior on many items. The temperamentally weak prefer both solitary pursuits and social stimulation less than the average of the other groups. The group lacking poise shows a superficial and naïve social activity. The weak-willed group succeeds only in easy circumstances in contrast to the socially reserved group, which is not only reserved but also willful, lacking good will, and dominating.

Whether this study validates the German total personality studies by the Strong Interest Blank or vice versa is not made clear. In spite of the interesting report, there is no record that interest blanks or paper personality tests are used in the German psychological work.

PERSONALITY

Nineteen of the 23 references found on the topic of personality concern German studies. The bulk of these have to do with officer selection. General articles on the subject have been written by Masuhr (42), Schänzle (57), Simoneit (60, 62), Walther (66), Wohlfahrt (70), Lubrich (39), and Simoneit, Zilian, Wohlfahrt, and Kreipe (64). The Woodworth Personal Data Sheet as reported by House (28) has been the source of many of the personality inventories which have followed; it was devised for picking out men suspected of being likely shell-shock victims.

Forlano and Watson (20), on the basis of a paper-and-pencil test, report in a study of United States R. O. T. C. students that those selected as sergeants were significantly more extroverted than were student privates and corporals. The difference in personality between the group electing military science and the group not electing it was insignificant, as was the difference between the group high in military science marks as contrasted to the group low in these marks.

Evaluating character was part of the officer selection program in the Swiss Army according to the report by Carrard (11). Giurca (22) mentions instincts, emotions, temperament, introversion-extroversion, and emotional stability as points on profiles plotted for Rumanian military school cadets, but gives no detailed descriptions of the tests. Mira (44), in describing psychological activities on the losing side in Spain, writes that the troops selected by a questionnaire had neurotic troubles three times less frequently than those not so selected. Jobs and men were classed in three groups depending on the proximity of duty to fire. Emotional control was one of the considerations in selecting antitank soldiers.

Hopkins (27), while in Hungary, saw photographs taken, unknown to the candidate, when in conversation, being questioned, experiencing painful and unexpected stimuli, and working an ergograph.

Tests of accident reaction and taking an electrical shock, apparently used as cues to personality, are mentioned by Hesse (25). German military psychologists are said by Nass (51) to have satisfactory methods to pick out men with characters desirable for tank drivers.

Nuber (53), in a book on the selection of officers, outlines the four analyses used in the German testing program: (1) *expressive*: mimicry, bearing, speech, and writing; (2) *behavior*: conduct and

social behavior in the leader test and the colloquium; action in command series and in the motor, technical, and bodily performance; (3) *mental*: interview and intelligence test; (4) *life history*. Personality enters into all of these; the central core of the whole German synthesis is the total personality.

The psychologists describe the personality while the officers make the evaluation, according to Hesse (26); the last word belongs to the regimental commander. In the leader test, a candidate's speech is analyzed with attention to phonetics, tone color, articulation, tempo, and rhythm, as these show temperament, emotion, and will.

Simoneit (62) describes the examination of groups containing up to eight men assembled at the testing place where they live and are examined for two and one-half days. Behavior observations are made by two officers, one medical officer, two psychologists, and one psychological assistant. In the analysis of action, such attributes as coöperativeness and impulsive peculiarities are mentioned; in all the analyses the emphasis is on the manner of doing, more than on what is done.

Elsewhere Simoneit (60) details the characterological approach. Several of the tests mentioned as work samples also function as personality tests. Spontaneous action is tested in a 45-minute-long test, called the "command series." The candidate has to carry out certain commands, but how he does so is his own affair. He can pay attention either to speed or to quality. When the tasks are repeated, he must consider the time factor; the repetition of the task is done to see how the candidate performs when he is excited. The reservoir of the candidate's energy may be tapped, however, only by dealing with other men as he does commonly in life. For this reason the "leader test" and the "final colloquium" are arranged. The "leader test" is not devised to tap the pedagogical ability of the man but his manner of action as well as its strength and its position in his makeup. This is the high point of the characterological examination, for to influence other men the candidate must call on all the reserves of his personality. In the "final colloquium" the candidates are assembled together so that their behavior in the company of their equals can be observed.

Further details about tests which indicate temperamental trends are furnished in the Martin report (40):

Paraphrasing a poem and choosing the most favoured reproduction of various pictures of the 'Medici Print' type are included. The poems

require some powers of literary apprehension and judgment and a sensitivity of feeling tone capable of appreciating resignation, irony, symbolic or metaphorical significance, et cetera. The aim here is to select officers not only endowed with knowledge, but also those possessing culture, humanity, and breadth of outlook. The pictures chosen reveal general temperamental predilections, for the idyllic, the heroic, the humanistic and the technical.

There are two 'command' tests, for which purpose some soldiers are always available for use in the laboratory. In one, the examinee is required to give some of the standard commands, 'Attention!' 'Eyes left!', et cetera. This reveals quality and control of voice and the general attitude of the examinee, whether of shyness, embarrassment and uncertainty, of calm, commanding superiority or blustering domination.

In the other section, the examinee is required to give a soldier certain instructions, such as taking a despatch to a given place by a specified route, avoiding certain indicated danger spots. . . . The test assesses powers of simple exposition essential for a commissioned officer.

In the next section, . . . the stress situations are continued for over an hour. Instructions require the candidate to carry out a long series of disconnected tasks which must be remembered in their correct order. The test calls not only upon comprehension and memory, but also upon the agility of the man. Thus he is required to balance on a narrow pole in full military kit.

But the capacity for improvising solutions for technical problems arising in an emergency is also involved. One of these tasks will have been carried out previously under normal conditions. It is now repeated with the suggestion that there is actually existing a stress situation. . . . The reduction of time in this second performance is taken not only as an effect of practice, but also as an indication of the examinee's reliability to act quickly and calmly in such a situation. Conclusions about temperament can also be drawn from the observation of involuntary nervous gestures, styled technically, 'motoric' signs.

Willingness and persistence, in addition to physical strength and agility, are measured by means of a wall of smooth planks which the examinee must climb in full equipment as often as he can. The number of times the wall is scaled is not so important as the readiness to use the last resource of strength. . . .

These tests of personality rating have been increased in recent years by systematic experimentation. One of the most interesting tests involves the following procedure: the examinee sits on a chair with his feet against a rail, and pulls with both hands a spring exercise expander affixed to the wall in front of him. Through the handles of the expander is sent a steady increasing electrical current. The set task is to hold out as long as possible under this double burden of stress, which sets up considerable strain. . . . Behind the wall is set up a film camera unseen by the examinee. This records through a slot his facial expressions. . . .

To this section belong also personality questionnaires. One of the psychologists working in the laboratories is specially experienced in the administration of the Rorschach test, and there is also one experienced in

graphology. The results of these test samplings are included in the final estimate.

The examination concludes with a general discussion by the examinees of an allotted topic. The examiners are present but do not participate. The discussion is primarily of clinical significance, revealing such qualities as vivacity, alertness, confidence, aggressiveness, obduracy, range of interests and sympathies, direction and breadth of outlook and nimbleness in meeting and countering arguments.

A 'follow-up' of each candidate is carefully made. After three, six and twelve months' training, the training staff personnel record their opinions about each individual officer applicant who has passed through their hands. It has been found that, on the average, these opinions diverged from those given earlier in the laboratory in only about 2 per cent of the cases. These results show that the preliminary examination is really capable of selecting suitable available human material for officer training to the extent of 98 per cent.

Such a batting average sounds impressive, but in the absence of more details there is no way of evaluating the validity of the system except to state that it sounds superior to no system at all.

BIBLIOGRAPHIC NOTE

The *Psychological Abstracts* and some military journals were the starting points for our bibliography. Those instances where the original article was not located are noted in the bibliography. (# indicates that only the title was seen; *, that only the abstract was seen.) Although the writers do not claim absolute completeness, sufficient studies are covered to show the major trends.

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THE EFFECTS OF CERTAIN DRUGS ON MENTAL AND MOTOR EFFICIENCY

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The writer has attempted to assemble those studies dealing with drug effects which have a bearing on the problem of mental and motor efficiency. In general the bibliography has been limited to the more commonly known drugs and to the literature of the past 10 years. It is also selective in the sense that many studies of a purely clinical nature and those which bear only remotely on psychological effects have not been included.

Conclusions regarding drug effects must always be carefully qualified and delimited. Such factors as dose size, manner of administration, relation to the ingestion of foods, liquids, or other drugs, the kind of work and amount of exercise in the daily regimen, amount of sleep, the function chosen to serve as an indicator of the drug effect and the method used to measure it, the effects on subjects' attitudes and motivations of knowing (as they usually do) that some drug effect is being measured, and their ability to compensate by extra effort for an anticipated decremental effect—all these may be as important in producing the results secured as the chemical nature of the substance with which the experimenter is primarily concerned. When we add to these intra-individual variables the great range of individual differences in susceptibility to drug action, the difficulties of making broad generalizations in this field are obvious.

Despite the above, the writer will be forced by the limitations of space to omit many of the qualifying statements which should accompany such characterizations of results and trends. It is to be hoped that the reader will continue to remind himself of this as he reads these pages.

GENERAL

Several reviews and bibliographies are available to the reader who wishes to acquaint himself with the earlier studies (1, 3, 4, 5). A review of some of the more recent drug experiments is included in a study by Shock (6). For inclusive accounts of the manifold effects of all recognized drugs a recent standard manual of phar-

macology such as that of Goodman and Gilman (2) or of Sollman (7) should be consulted.

ALCOHOL

The student of psychological effects of alcohol will be immensely benefited by several major bibliographic and review accomplishments of recent date carried out by the Research Council on Problems in Alcohol. They include: (a) the founding of a journal devoted to studies on alcohol (11), in which it is planned to present an annual review of contemporary research in this field; the first such study has already appeared (9); (b) a projected comprehensive survey of all the literature on alcohol, from earliest times to the present; this is to appear sometime during 1941; and (c) a searching and critical review and appraisal of the experimental literature on the psychological effects of alcohol, from the early experiments to May, 1940, with a selected bibliography of nearly 200 titles (10). There is also much material of psychological interest in the symposium edited by Emerson (8).

The evidence that has been amassed forces the conclusion that alcohol has a depressant effect; this is true of all psychological functions yet measured. Discrimination seems to be affected more than acuity, and the more complex mental functions to a greater extent than the simpler ones. The general picture is one of reduced efficiency.

BARBITURATES; ALSO ASPIRIN AND BROMIDES

Studies demonstrating the uniformly depressive effects which these substances have on psychological functions have been presented by Curran (12), Lindemann (13), and Tatum (14) and are discussed by Goodman and Gilman (2) and by Sollman (7).

BENZEDRINE SULFATE

This interesting new drug has been the subject of numerous studies in the eight years since its appearance. It has gained widespread attention because of the many reports of favorable effects exerted on mental and motor functions.

There is evidence that benzedrine increases speech and other motor activity (27, 29, 38) and produces a heightening of confidence, willingness to work, self-estimation of quality of performance, and general mood (17, 30, 31, 34, 44). Speed of tapping, strength of grip, and hand steadiness seem to be favorably affected (43). Taken late in the day, benzedrine commonly produces some

insomnia (29, 34), but it is apt to be pleasant rather than otherwise, due to heightened mood and "peppy" feelings.

Improved school performance in problem children has been reported for the duration of administration of this drug (23). Some experimenters have found an increase in intelligence test scores in their benzedrine groups as compared with control subjects (32, 33, 39), but in no case has it been demonstrated that the obtained differences are statistically significant. Other experiments have failed to show any favorable effect of the drug on intelligence test scores (18, 24). Still other studies have shown no favorable effect on reaction time (43), on span of attention for letters (19, 41), on rote memory (24), or on the multiplying of three-place numbers (31). The drug in moderate doses has not been shown to affect adversely any psychological function tested. Too large a dose, however, has frequently been reported to reverse some of the effects secured by optimal doses.

The studies to date seem amply to justify the assertion that benzedrine in the proper dosage can be of considerable value in temporarily increasing the efficiency of performance of a variety of mental and motor functions and in delaying the onset of drowsiness and sleep.

Brief reviews of studies on the psychological effects of benzedrine have been presented by Bloomberg (22) and by Shock (42). Goodman and Gilman (2) have made a comprehensive survey of benzedrine; they include a bibliography of 95 titles, many of which describe psychological effects.

CAFFEINE

Hollingworth's monumental 1912 study of caffeine effects (51) has stood the test of subsequent research well and is still a primary reference for students of the effects of this drug. Recent studies have uniformly shown caffeine to shorten reaction time (43, 46, 47, 49, 53) and to produce a decrement in hand steadiness (49, 51, 55). Some experiments have reported that it exerts rather conflicting effects on the efficiency of certain mental functions (45, 52, 54, 55). A recent report (56) asserts that color sensitivity is heightened following caffeine ingestion. The general effect of this drug seems to be in the direction of a slight increase in efficiency rather than otherwise.

CANNABIS

This drug (better known as hashish or as marihuana) has only recently come to prominent attention in this country. Its striking

psychological effects and alleged addiction potentialities have made it the subject of a number of recent studies. The most comprehensive is that of Walton (64), in which the available literature is thoroughly reviewed, including descriptions of subjective and behavioral effects. A bibliography of 419 titles is appended, grouped by topics. Several other studies are concerned mainly with the psychological effects of cannabis (58, 59, 60, 61, 62, 63).

These studies agree that the effects of cannabis are decidedly unfavorable to mental and motor efficiency. Following ingestion of the drug there may be an initial period of restlessness and anxiety. Soon comes euphoria and talkativeness with subjective feelings of being very witty and brilliant, although, objectively, considerable confusion in orientation and in immediate memory can be demonstrated (61). Marked distortions in perceptions of time and space and in perceptions of size of the body are common (59, 62). Visual hallucinations with bright lights and colors are frequently reported (61, 62). It has been asserted that cannabis is a sexual stimulant (59, 61, 62), although Walton concludes that the drug as such has no effect on sexual excitability. It is questionable whether chronic use of cannabis can be termed a true addiction, since a physiological dependence on continued use of the drug has not been shown to develop (59), as it does with opiates.

MESCAL

For general descriptions of the effects of this drug the reader is referred to the accounts of Klüver (66) and Petrullo (67). Among other effects, mescal is reported to produce striking visual and auditory hallucinations and a distortion of time perception (65, 66). A recent study (68) stresses the similarity between mescal effects and the syndromes of certain psychogenic psychoses. The confusion, disorientation, hallucinations, and the gastric upset produced by mescal ingestion clearly imply an interference with normal psychological functions.

METRAZOL; ALSO INSULIN

Shipley and Kant (71) have reviewed the literature pertaining to the insulin and metrazol treatments in schizophrenia and have described the psychological effects of administering these drugs. They list a bibliography of 56 titles. Other recent descriptions of metrazol effects have been presented by Fingert, Kagan, and Schilder (69), Schilder (70), and Wittman (72). That metrazol exerts a profound psychological effect is beyond question. The common-

est preconvulsive effect is marked apprehension, frequently accompanied by fear of imminent death. Consciousness is typically lost during the convulsive state. The postconvulsive state is characterized by mental confusion and retarded activity. Distortions in visual and spatial perceptions may occur. Temporary amnesias and aphasias may be present (70). Patients' scores on psychometric tests made during the postconvulsive state indicate that mental efficiency is considerably lower during the first hour, but is almost completely recovered by the end of the fourth hour (72). Motivational factors are undoubtedly a complicating variable here.

MORPHINE AND OTHER OPIUM DERIVATIVES

By far the most thorough attempt to assemble and assay the literature on opium and its derivatives is that of Terry and Pellens (75). The reader will find there many descriptions of the psychological effects of administering these drugs, both in isolated doses and chronically. Extensive bibliographic material is presented. Goodman and Gilman (2) and Sollman (7) offer descriptions of the psychological effects of varying dosages. A study by Seevers and Pfeiffer (74) is unique in this field. These workers experimentally administered morphine, heroine, dilaudid, and codeine to human subjects; they noted that for each drug subjects reported mental sluggishness, inability to concentrate, muscle weakness, and incoördination of speech and other movements. Morphine appeared to be most potent in producing this decrement, followed, respectively, by dilaudid, heroine, and codeine. Light and his associates (73) have presented excellent descriptions of the psychological effects of (a) withholding the drug from addicted persons and (b) giving an injection of the drug to terminate a withdrawal period.

It is clear from the experimental and clinical evidence available that the administration of opiates to nonaddicted persons produces a depression which is accompanied by a reduction in mental and motor efficiency. On the other hand it is equally clear that the administration of opiates to addicted persons will restore to a "normal" or usual level those mental and motor functions which are so profoundly disturbed by withdrawing the drug for one to three days.

TOBACCO SMOKE

Hull's (77) carefully controlled investigation remains the most adequate experimental study available in this field. This investi-

gator tested the effect of smoking a pipeful of tobacco on a variety of functions. He found that hand steadiness was significantly interfered with and that habituation to tobacco did not eliminate this effect. Tapping rate was not affected. Most mental functions tested showed no significant effects of smoking. However, one of them (complex mental addition) showed an interference effect in nonsmokers and a facilitative effect in habitual smokers. Another (rote learning) seemed to be slightly retarded by smoking.

Winsor and Richards' (80) subjects, who smoked cigarettes (inhaling deeply), showed resultant unsteadiness of the hand. With continuation of the experimental regimen there resulted a marked, but gradual, tolerance to this effect, amounting to a reduction of about 50% in the unsteadiness. Fay (76) was not able to demonstrate any significant effect of tobacco smoking on simple or choice reaction time to colored lights. It is reported that Lottig (78) found a marked reduction in mental efficiency at high altitudes if use of nicotine was combined with lack of sleep. Powell (79), reporting a series of student theses, asserts that smoking produces an increment in the speed of visual accommodation.

The available evidence from careful experiments in this field favors the conclusion that, aside from hand steadiness, tobacco smoking under the conditions tested produces but little effect on mental and motor efficiency.

WAR GASES

The interested reader will find accounts of the physiological and psychological effects of chemical substances which have been employed for this purpose in the manuals of Sollman (7) and of Goodman and Gilman (2). The former treats the subject in connection with his general discussion of volatile and nonvolatile irritants and of systemic actions of gases. The latter writers devote a chapter to war gases and describe some of the psychological, as well as the medical, aspects of exposure. They append a list of references to the literature on this topic.

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FATIGUE

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Two comprehensive reviews, that of Robinson (49) in 1934 and that of Viteles (53) in 1932, adequately summarize findings in the study of fatigue up to their time. The former gives consideration for the most part to laboratory experiments, while the latter includes more readily applicable data from actual industrial situations. It may well happen that some of the typical laboratory studies treated by Robinson, involving work decrement and fluctuation in short periods of rapid output ranging from a few seconds to a matter of minutes, may assume a new practicality in view of the developing tendency in modern combat toward short bursts of intensive activity, as in aircraft machine gun battery firing.

In more recent treatment of fatigue problems there continues a regrettable unwillingness to consider work decrement empirically and from the standpoint of the organism as a whole. Dill, Bock, Edwards, and Kennedy (17), for instance, contend that the breakdown of the finger in ergographic performance is a problem that concerns the physiologist, while output in the usual industrial job is a problem for the psychologist, psychiatrist, and sociologist. Dill (15), furthermore, sees the very real contributions of the Industrial Health Research Board of Great Britain in the investigation of output decrement and variability accompanying the experience of boredom merely as a pseudosolution to the fatigue problem—a solution consisting of renaming. Wyatt and Langdon (58) have since demonstrated decrement in the same subjects accompanying monotony at a slow speed of machine operation and associated with strain and tiredness at a higher speed in the same task.

Trends of output in fast light manual work are reported by Philip (43) from a laboratory experiment involving work spells of far greater duration than is customary for this type of activity. Tapping was maintained with surprisingly little decrement (even conceding an opposing practice effect) for from six to seven hours, with less than three rest periods on an average per subject. Periodicity characterized the output curves of 7 of 12 subjects. In another study (44) in which a like work period was broken into

10-minute trials, Philip found that the short period work curves formed a series of short hyperbolas in conformity with results previously reported by others.

Whitehead (56) similarly finds little decrement in performance of a light manual industrial operation. Average hourly production curves calculated for periods of some months for each of five workers rarely showed deviations of more than 5% from their average except for the early part of the morning spell. As a matter of fact, these output curves often showed a rise during the afternoon period, continuing to its end, though output was generally lower in the afternoon than in the morning. Graf (22), reporting on the output of conveyor operators working at their own pace, also notes a tendency to speed up work in the afternoon, but in this case it occurred when morning output had been low. Graf (23) recommends use of an indicator informing the worker when he is working too slow or too fast, rather than an imposed rate of operation.

Dill (15) concludes that the moderate activity of modern industry causes little fatigue effect as indicated by the physiologist's measurements of pulse rate, lactic acid, respiration, oxygen consumption, etc., and offers a classification of moderate, hard, and maximal work on the basis of the ratio of metabolic rate in work to the basal metabolic rate. He includes a review (1936) of metabolic findings in studies involving work thus classified. Dill, Bock, Edwards, and Kennedy (17) contribute a noteworthy discussion of industrial fatigue with simple treatment of the questions of fatigue substances, exhaustion of energy reserves, inadequacy of oxygen supply, and alteration of the physicochemical state. Lahy (30), employing a portable laboratory carried on 18-hour truck routes, finds that reaction time and dynamometer performances suffer with prolonged driving. Other investigators have observed energy exchanges involved in the work of carpenters, masons, mechanics (41), and metallurgy workers (40). Much of recent experimental work in muscular exercise and its accompanying bodily changes is treated in a review by Dill (16).

Among numerous studies in mental fatigue by Bills is one pertaining to the extent of transfer of fatigue from one task to another in relation to the proportion of elements common to both. Output curves here resulted which resemble in general form those which have been found in repetitive work situations in monotony studies of the Industrial Health Research Board. Problems in mental fatigue including its practical differentiation from physical fatigue, its indices, and its principles are well treated on the basis

of experimental findings in a survey by Bills (7), who in the same year summarizes the literature on facilitation and inhibition in mental work (6).

The contention of Haggard and Greenberg (24) that industrial output is favorably influenced by an increase in meals from three to five per day has not met with general acceptance because of the lack of adequate controls in their supporting study. Laird (31) and Weston and Adams (55) describe the adverse influence of noise upon a motor task performance and the work of weavers, respectively. Effects of the loss of sleep upon behavior are comprehensively reviewed by Kleitman (28), and Edwards (18) subsequently adds an experiment in which loss of sleep has been extended to 100 hours with results in accord with those of earlier studies.

The search for additional criteria of fatigue continues with Hollingworth (26) offering perceptual fluctuation, Wickwire and Burge (57) the threshold stimulus for the patellar tendon reflex, and Feree and Rand (20) speed of accommodation in near and far vision as measured by a tachistoscopic instrument. Evidence for a relationship between ordinary fatigue and alteration in behavior resulting from the low oxygen tension of high altitudes is cited by Bills (5). Whether or not such a relationship is ever definitely established, studies in low oxygen tension such as those reported by Barach, McFarland, and Seitz (2), Seitz (51), and McFarland (35, 36) and reviewed by McFarland (37) represent invaluable contributions toward a more complete understanding of variation in man's behavior.

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GERMAN MILITARY PSYCHOLOGY

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INTRODUCTION

This bibliography presents German military psychology in terms of what those employed by the German War Department as military psychologists have published or referred to.

For a proper appreciation it is important to realize that each item listed is part of a unified approach, which aims primarily at the understanding of the whole personality, so that each man in the army will be made to function efficiently according to his individuality. The greatest danger for an army is seen in its becoming a mass (99), and its greatest asset is superior leadership. "Our hope for victory is founded on intellectual superiority of the German officer" (71).

The selection of officers is based on the evaluation of a board of psychological examiners, who rate qualitatively a great number of samples of an individual's behavior. Objectivity is sought in using a number of judges. They set forth their combined evaluation in a comprehensive case report. "Psychological diagnosis will, for a long time to come, remain the problem which will dominate almost exclusively the entire research in military psychology" (113).

THE ARMY PSYCHOLOGISTS

Training

Selection on a qualitative basis requires a relatively large staff. Thus we find that, in 1936, 114 psychologists and 17 officers were employed in the central psychological laboratory in Berlin and in 15 testing stations attached to the various army corps (112), and just prior to the war 200 psychologists were reported (5), although testing was always limited to officers and specialists.

The training and career of the military psychologist were determined by law in October, 1937 (4). The career is not that of an officer, but rather that of a military employee. The basic requirement is a Ph.D. in psychology, after which an application may be filed with the psychological service of the army, provided the applicant is not color-blind and possesses sound localization ability

and stereoscopic vision. The upper age limit is 26 years. He must have a natural psychological ability as expressed in an inclination to form human contacts, sensitiveness, decided social interests and attitudes, kindness, interest in youth, and self-discipline. During the conduct of an examination he should be able to meet the testee on his own level. It is emphasized that the personality of the psychologist is more important than the methods used (99).

Once accepted, he is admitted to three years of preparatory and probation service divided into: 3 months at the central station, 24 months at a field station, 6 months at training schools of the special branches for which special aptitude tests are used, and a final 3 months at the central station.

A comprehensive examination follows the preparatory service. Besides psychological knowledge and skills, a broad cultural background is required, particularly in contemporary literature. The board of examiners consists of four persons: a general, two army psychologists, and an academic psychologist. The examination consists of a thesis, an oral examination, and the administration by the candidate of psychological tests to three officers. After this examination he is qualified for permanent employment as army psychologist.

Every year the psychologists and the army officers concerned with selection meet for a continuation course at the main office in Berlin (123).

Organization

Psychological testing had been set up by 1927 (148)—that is, well under the regime of the German Republic. An intramural publication of the psychological laboratory of the army, *Charakterologische Arbeiten* (33), preceded *Soldatentum*, which was founded in 1934 as a regular journal. The evolution of the title page of this journal (122) sheds light on some interesting points. Up to 1937 the publishing organization was the "Psychological Laboratory of the War Department." From 1938 up to the outbreak of the war the name was "Central Office of the Army for Psychology and Race Study." With the outbreak of the war this name was replaced by "Central Office of the Inspection for Aptitude Tests," which, in November, 1939, the last issue seen, was changed once more, to "Inspection for Aptitude Testing in the High Command of the Army." In Germany then, too, as in the United States, it was found advisable to drop the term Psychology. The term Race Study was altogether short-lived. The journal has always been

edited by a military director, until recently General Von Voss, and a scientific director, Max Simoneit, who must be regarded as the dean of German military psychology.¹

Literature

The main publications, or media of publication, are summarized by Simoneit (116). His list covers by far the greater part of the literature and must be considered the foundation of an approach to the field. Another source is the annual bibliography in the *Zeitschrift für Psychologie*, which, since 1934, has a section on Military Education and Soldierdom. One hundred and twenty-eight titles are listed there from 1934 to 1938, but further material may be found in other sections (30, 125, 126, 127, 128). The present writer collected more than twice as many items. This great number is largely due to the fact that the same basic material by the same author is presented in a number of media. The purpose of this procedure as stated in a publisher's announcement for one collection of articles is "to acquaint the psychological public with the activity of army psychology." Since some material is published in semipopular magazines and the daily press, it may be seen that the attempt is made to acquaint the public at large as well.

FIELDS OF GERMAN MILITARY PSYCHOLOGY

The basic systematic presentation of military psychology is by Simoneit (99). His book is valuable in conveying the principles of the approach and the procedures. The field of military psychology is divided into (1) sociological psychology; (2) job analysis and tools; (3) characterological psychology of selection; (4) training and education; (5) morale, symbols, and equipment; (6) propaganda and psychology of other countries (*Völkerpsychologie*); and (7) conduct of war and combat (99, 123).

Sociological Psychology

Sociological psychology deals with the psychology of military organization, psychological advantages and disadvantages of different military systems, and certain psychological features of different types of military activity. It has no further part in the literature.

¹ A later issue seen since the present paper was written shows that beginning with 1940 *Soldatentum* is no longer published by any official agency, with Simoneit as editor, but by the firm which formerly acted as distributor, with one of their men as editor.

Special Aptitude Testing and Job Analysis

Automobile driving, aviation, marching, orientation, radio operation, range finding, shooting, sound detection, tank driving, etc. are covered. In the selection of specialists, as of officers, personality traits receive foremost consideration; special aptitude testing is always preceded by a characterological investigation.

Characterology

Characterological psychology is overwhelmingly the largest part, including, as it does, officer selection, which will be dealt with in a separate section.

Many of the characterological articles deal with typology (25, 44, 47, 54, 55, 57, 59, 60, 61, 143) and race (81, 140, 142, 145, 146, 147, 148), as would be expected. But the undertone is always one of caution in applying such principles to individual selection. One article (44) by someone not on Simoneit's staff is supplied with a footnote by him to the effect that the article is published on certain merits, although Jaensch's typology, on which it is based, finds one-sided application. Another article (55) rejects selection on the basis of Jaensch's perception types. Kretschmer's typology is not found of direct practical usefulness for military selection (61). Regarding typologies in general, Simoneit (101) states: "It must be admitted that most personality types do as yet not quite permit an abstraction of their laws." "The honest research psychologist must admit that nature in some cases upsets his rules of types."

Racial characteristics are seen as giving only certain hints to the individual personality (147) and are mentioned on one level with a person's social class, profession, and religion (140).

Regarding heredity in general, Simoneit (113) states: "We have but completely inadequate criteria to prove that a condition is determined by a disposition, i.e., that it depends on an hereditary constant factor." Still it is conceded that racial and constitutional type must be considered (114).

We find, then, that those aspects of recent German psychology which have been largely considered scientifically unsound abroad are dealt with by the military psychologists outwardly in an affirmative manner, but are left aside in ultimate application. Sociological data are treated in reference to aptitudes (65, 66), the punched card method finding use in this connection (68).

Ethics and Training

Education and training are seen as goal-directed processes (40).

The goals must be supported by ethical definitions. This is done by Simoneit in his *Military ethics* (107). The principle that "the end justifies the means" is modified to read: "The socially meaningful, noble, genuine, religious, ethical sentiment justifies, sanctions the means." On page 60 Moltke is cited as saying: "Eternal peace is but a dream—and not a beautiful one at that." On page 58 he is cited as saying: "Without war, without the sentiment which includes the readiness for war, mankind would perish in the swamp of materialism." Simoneit elaborates on this: "Even a lost war brings blessings, as we Germans have experienced. Like a renaissance, it made us start from nothing; and as a result we have reached a deep insight into our real nature which in turn led to a reorientation and ultimately to a new creative will to live. Still, war must never be sought. Although we find the blessing in its tragic fate, it is but the blessing which can be created in life through any fight against evil." A differentiation is made between natural, just wars which provide a really ennobling experience, and others which are of a more superficial nature and thus provide only bad experiences. The frontline soldiers are exalted to sainthood. In a monograph on the cultural achievements of the German officer (106), which is a supplement to the larger work, Simoneit says that German soldierdom is not barbarism but serious culture; soldierdom has a central location in the soul of the German people; officership is something arch-German; in every field of national culture officers have made outstanding contributions; military leadership is one of the high forms of German humanity; as an eternal type of the Germans it will continue to become more and more pronounced.

In the vein of these writings numerous smaller papers by various authors are found. One, on the psychology of soldierdom (138), describes soldierdom as a mental attitude which is to be considered a fundamental form of the new German culture and society. There are articles on the concept of soldierdom (100), soldierdom as a way of living (102), soldierdom and the world of the worker (12), and soldierdom and the world of the bourgeois (80).

Conscription is discussed as an educational concept (104), and the educational psychological problems in army service regulations are reviewed (36). A survey of practical training in the army with consideration of psychological, pedagogical, and philosophical factors is presented in a treatise by Altrichter (2).

Regarding the nature of discipline, opposing views are found.

One, represented by Dirks (18), favors strictest discipline even if some individuals should break down. Hansen (40), on the other hand, favors individualized training. The army cannot afford failures in its educational attempt. According to him the days of blind obedience are gone. Mere subordination would not be adequate to modern fighting conditions. Through machine gun nests, tanks, and airplanes an army fights in such small units that every single man must furnish his own inspiration and be his own officer. Therefore the active participation of the individual in the training process must be elicited. The sergeants must be educated to understand the individual and deal with him accordingly. Discipline enforced on such principles will be the more valuable because active participation will have been enlisted. It appears that sergeants are actually educated along these lines, and some further papers on this topic are found (35, 39, 131).

In connection with training, several items should be mentioned merely to outline the sphere of interest of the military psychologists. Military training and war experience are discussed in a book (129) and a paper (21). Two titles are concerned with the relationship of war history and military psychology (110, 117). Further papers are concerned with the biography or views of historical and contemporary military and political leaders (14, 19, 32, 64, 79, 90, 95, 130) and of Nietzsche (17, 41). Some of these papers are also relevant to characterology.

Morale, Symbols, and Equipment

Pertaining to the latter part of this heading we find only one paper (33), in which it is pointed out that uniforms and equipment must not only be practical but also dignified in design and such as to make the wearer feel proud. Under morale, egotism and vanity (73), homesickness (11), queerness (16, 29), and homosexuality (37) are seen as endangering the *esprit de corps*, and advice is given for dealing with such cases. The positive factors are social interest (23, 84, 96) and a general belief in one's own value (62, 97). Finally, religion and the soldier are considered (58, 69, 77, 82, 89). Regarding the question of chance *vs.* fate, Simoneit (111) finds that a tendency to expect complete certainty always works against daring. In order to secure freedom and mobility of action for soldiers, there is needed a training toward respect for fate, a "higher force." A belief in mere chance would be dangerous from the point of view of morale.

Propaganda and Psychology of Other Countries

Both these fields seem to be headed by Blau. On propaganda as such there is practically no literature. Blau's basic work on propaganda as a weapon (7) is only for official use and has not been made available to the public. Another book by the same author (8) has not been seen by this writer, nor was any review found. A book by Pintschovius on morale in modern war (84) is frequently referred to. It deals with the failure of Germany in the use of propaganda during the last war. It is stated that the best way to strengthen morale is to start work on this problem in peacetime through the army officers and party officials, and to begin with the school child. Reference to a bibliography on mental warfare was found (94), but it was not seen.

On the psychology of other countries (*Völkerpsychologie*) there are five articles (9, 10, 31, 46, 75). *Völkerpsychologie* is concerned with the characterology of other nations. "We must know with what opponents our men will potentially have to deal, of what nature their soldiers and military leaders are, where their strengths and weaknesses lie. . . . We must be able to size up the peoples as a whole, their tenacity, discipline, and readiness for sacrifice" (46).

The method followed is analogous to the characterological evaluation of the individual and deals with three main aspects of a nation: (1) its origin, corresponding to the individual life history; (2) its social, political, and cultural achievements, corresponding to intelligence analysis; and (3) its actions throughout its domestic and foreign history, corresponding to action analysis. On the basis of such information conclusions as to what may be expected from the nation are drawn. Particularly from the extent to which its part in history was active or passive one may conclude as to the future power of resistance (9).

The individuals of a nation are studied by living intimately among them as a friend. Knowledge of the language is indispensable. The psychologist, however, must not live so long among the respective nations as to lose his perspective, and it is also advisable that he write his report at home (10). Furthermore, community studies of entire villages or industrial centers are conducted (9), but no indication is given of how this is accomplished. All available statistics are used in so far as they may be of psychological relevance.

On the basis of a study along these lines the Balkan peoples are characterized as: extremely conservative, very superstitious, strongly devoted to their families, governed by home rule to a

great extent, and seeing in work no other satisfaction than profit. In spite of different languages and governments, they form an essentially homogeneous group, distinct as a whole from the neighboring groups (10).

The English are evaluated on the basis of a study of nineteenth-century literature and documents as showing the following characteristics: strong spirit of individual enterprise, initiative, sense of responsibility, and striving for personal freedom and self-government combined with strong national unity. The economic aspect takes the foreground, the military the background, and an unshakable belief in the right of the English people to rule is supreme (46).

According to a special report to Secretary Knox (20) the section of the psychological laboratory concerned with these matters is kept secret. "Here are trained not only the military spies but the Gestapo and party agents especially designated for service abroad."

Psychology of Combat and Conduct of War

This section includes the problem of panic. This and the minor disturbances dealt with under morale are the only two instances where the military psychologists are concerned with abnormal psychology. Apparently the problem of actual war neuroses is left entirely to the psychiatrists.

We find a short review of methods of relaxing a state of panic (109), and the influence of leadership in sudden danger is discussed (76). The conquest of fear demands subjugation of the ego to a common ideal and the call of duty (70). According to one author, only hints can be given regarding panic, but no solution, inasmuch as elementary phenomena such as panic cannot be solved (6).

The papers on the effect of actual war experience draw on selections from the literature and letters and diaries of soldiers from the last war (34, 49, 63, 72). Two papers may be mentioned. Mierke (72) glorifies the deeds of the troops during the last war. The war experience liberates the ethical resources of the individual, the belief in one's own strength, the feeling of group solidarity, and the sense of duty. Lüderitz (63) points to the strong forces unifying the men in the front lines. But this feeling does not continue once the fighter has returned. At home he resumes his old personality. One interesting statement is that the soldier at the front has more sympathy for the soldier in the enemy trenches than for his own hinterland troops. The real war experience is shared only by a few.

One paper deals with sociological and personality factors as determinants of an individual's attitude in actual combat (45). Also the effects of various phases of combat such as mine explosions (118) and massed artillery fire (48) are discussed. Finally, a paper on the psychological state of the soldier before his capture deserves mention (28). Readiness for capture is produced partly through enemy propaganda and consists in a reorganization of the psychological field to the effect that one sees the other point of view and feels no longer exclusively identified with one's own cause.

SELECTION OF FUTURE OFFICERS

As mentioned above, selection of future officers seems to be the main task of German military psychology, and also the first undertaken when psychology was introduced into the army of the German Republic around 1926.

The procedures were published in outline form in 1930 by Hesse (42) and as a 29-page monograph by Simoneit in 1938 (114). The monograph was adequately reviewed in Belgium (115) and Italy (5), and several short papers presenting the same scheme have been found (3, 43, 53, 112). Simoneit's larger work (99) is relevant to this section. After careful analysis of these sources and one unpublished report, and their comparison with Hesse's paper, it can be said that but for unimportant changes the original procedure is still applied today.

Simoneit states that the methods practiced by the army psychological laboratory have not been entirely favorably received everywhere. It is in reply to the critics and in order to dissipate the apprehension of the officer candidates that the author has set forth in his monograph (114) the principles and the organization of the examination.

Principles

The following may be considered as basic. "If a non-psychologist in daily life wants to get to know someone he looks into his eyes, listens to his way of speaking and his language, looks at his handwriting, reflects upon his thoughts and way of thinking, and observes him during his actions. The sensible professional psychologist will do the same" (99).

(a) Scientific psychology must be combined with practical knowledge of human nature. This requires capacity (1) for a natural attitude toward the examinee as in real life and not as in an experimental situation; (2) to observe and evaluate symptoms

relative to everyday conduct, personality, intellect, and volition; (3) to express observations properly in a report; and (4) to reconstruct the total personality from single traits and relevant data.

(b) The whole personality must be considered. (1) One must not be led too hastily by the first impression. (2) One cannot compile a list of the proper attitudes for a soldier and expect someone to have them all. Such an individual does not exist. (3) One cannot select according to a type. The best soldiers may have quite different personalities. (4) Selection must not be influenced by the study of great generals. It is a matter of mass selection, not selection of geniuses. The question is rather whether the candidate will be likely to live up to the best in his own personality.

(c) The examination must keep close to everyday life. The four fields of the psychological examination are intelligence analysis, action analysis, expression analysis, and life history. For each of these, everyday life approaches have been worked out. (1) The method of intelligence tests has been abandoned; tasks of a serious character which are in rapport with daily life are given instead. The examination of intellectual faculties is supplemented by an interview between candidate and jury which represents the main part of the examination. (2) To test will and strength of character, work interest, and work capacity, attitudes and conduct in various concrete situations, including success and failure, are observed. (3) Emotions and emotional stability are judged through their external manifestations, such as bodily attitudes, gestures, reactions, and mimic expressions. (4) To learn the details of the subject's life history he is interviewed regarding his family, friends, youth, and school.

(d) The candidate's conduct should be observed throughout the entire examination. The candidate's way of performing a task is considered more prognostic than his achievement. Likewise, the facts of his life history are considered more important than his achievement at the examination.

(e) Constitution and race must be considered. In line with our previous observations we find only a negative statement to the effect that the examination of constitutional and racial factors is made difficult by their complexity, their variable character, and their sensibility to environmental influences.

(f) The possibility of compensation must be considered. In what direction may natural aptitudes or shortcomings influence the development of the individual? Do they or do they not transform the personality?

Testing Procedure

As partly indicated above, the objective of the examination is to obtain an evaluation of: general intelligence, loaded on the practical side; use of will power (planning, attention, clear thinking under physical and emotional stress, energy, perseverance, willingness to try with all one's might, and limits of capacity) and ability to manage (command) people; expressive movements (speech, face, gestures, handwriting); total personality (life history, interview).

The psychological examination of an applicant for commissioned rank lasts two full days. The examination is conducted by a board consisting of two officers, one physician, and three psychologists. This board is selected from the total psychological testing staff of each army corps, which consists of two officers, one physician, and eight psychologists. The officers of the station change rather frequently, but the psychologists are permanent. The report on a candidate submitted by the board is in the nature of an expert opinion and not deemed binding by the superior officer. However, eminent moral importance is conceded to it. The judgments of the board are subsequently validated by ratings during the training period.

The various parts of the examination program are arranged so as to obtain the confidence of the candidates and dissipate their apprehension. Most of the tests are administered individually; in the others the group seems to be limited to five. The testee, who lives at the testing station during these two days, must obtain the feeling that the examiners have his well-being at heart.

In tests where scores are obtained, these are almost incidental. Judgment is subjective. From many samples of behavior symptoms are observed; from a number of symptoms conclusions as to a personality trait are drawn; and judgment of a trait is not made until it seems to fit with the picture of the total personality (98). Thus every test item, be it designed as an intelligence test or one of motor performance, is used to judge the personality.

Intelligence Analysis

The candidate is presented with a picture and asked to describe it in writing. From this an impression of his power of observation and imagination is gained (42). In one paper the relationship of imagination to thinking is theoretically treated with reference to Klages (137).

In another test 32 objects are used which can be arranged on the basis of various principles. The task is to continue a series which has been started; the objects permit many variations of differing degrees of difficulty (139). In this connection specific reference is made to Ach (1).

What is called practical ability is observed from essay questions dealing with concrete problems of leadership such as: "Your sports club is planning a trip to Berlin to attend the Germany-England football game which will take place in two weeks. You have been entrusted with the preparations and entire management of the trip. What do you intend to do? Describe your plan in detail" (71).

Several further papers relate to thinking and intelligence (27, 78, 88, 105, 132, 133).

Action Analysis

(a) *Choice Reaction*. One of the main test items is a complicated choice reaction test, described in detail by Simoneit (98). In this report some quantitative norms and 10 figures with hypothetical learning curves are presented, and it is explained how the material is evaluated subjectively with regard to personality traits.

The approach goes back to Ach, of whom Simoneit apparently was a student. Another military psychologist, Kreipe, worked originally under Ach on a problem of choice reaction (50). The method of evaluating such tests characterologically is attributed to Rieffert. The characterological examination as arranged by Rieffert consists of several sections aiming at the analysis of expression, mental functioning, and action (98). He has published very little altogether, and nothing directly pertaining to the method except one paper read at a congress (87).

The first application of choice reaction to military purposes was by Moede (74) during the World War for the selection of people to be trained as automobile drivers. By continuing the choice reaction for a length of time, data on the following aspects were obtained: power of sustained attention in the presence of occasionally introduced distractions, uniformity of reaction, choice behavior, emotion, rate of learning, and fatigability. Moede describes the apparatus with several diagrams.

Simoneit's apparatus, essentially the same as Moede's, was constructed by Rieffert. It consists of a screen on which a red, a blue, and a white light, and a light with a circle and one with a square may be shown. Furthermore, two rattles may be sounded,

one from the right, the other from the left. The observer sitting in front of the screen has three hand levers and two foot pedals to operate. The lights are flashed on, and the observer is told which one of the three levers is to be pulled with each of the five lights. One of the pedals is to be pressed with the sound of one of the rattles. The instructions end with: "Move the levers and pedals one after the other and remember well what I have told you. At first errors will not be counted; take your time to work yourself in. But pull yourself together from the start, because I shall not tell you when the actual test series begins."

The stimuli are presented in a predetermined random order in 10 series of 30 each. During an intermission of two minutes the order is changed, after which another 10 series are presented. The entire test of 600 visual-auditory stimuli takes 20 minutes. All responses and reaction times are recorded automatically. During the test the subject is observed, and the observations are noted in detail. His adaptation to the situation, the performance itself, and the total behavior may be described. Each of these categories is subdivided into three to four parts relating to such topics as security of conduct, efficiency of movements, facial expressions, etc.

In another type of choice reaction test, originated by Rupp, four sticks are suspended by an electromagnet. As they are released, a bell, a rattle, or a horn is sounded. Four candidates are examined simultaneously; each is required to put his right hand loosely around one stick. The task is to tighten the grip when the bell is sounded, but to let the stick drop when either of the other two sounds is heard. This is done blindfolded. In a second series, with eyes open, three different lights are flashed. The task is again to grasp in response to one of the stimuli and to let go in response to the other two. A total of 40 reactions are tested in the two series. Power of concentration and particularly the influence of a social situation are judged from this test.

Ratings on these tests show little agreement with ratings on thinking, general intellectual ability, and technical ability. But an 80% agreement with ratings of general will power is found, and it is assumed that will power determines the attention required for these tests. Emotionality and introversion-extraversion are also reflected in the test situation. Correlation with general motor performance is very slight.

Volition conceived according to the above approach is treated in several other papers (51, 103, 108, 141, 144).

(b) *Command Series (Befehlsreihe)*. In this series, which takes

about 45 minutes (99), essentially will power and physical performance are tested. It requires the execution of commands and actions under one's own initiative and under specific, particularly physical, conditions. For example, the testee receives at the beginning of the examination the command to carry out the following orders at stated times: deliver a message, announce the time, put a letter in a box. Then he is asked to pack his knapsack and to get fully equipped with knapsack, belt, rifle, and steel helmet. Thus equipped, he must walk on a free-swinging pole and at the same time throw a rope over several hooks mounted to his right and left at various heights, attaching the rope firmly. Ratings on bodily agility, attention, intellectual efficiency, memory, etc. are gained from such tasks. During the test the examiner changes his tone of voice. Minor mistakes are severely criticized to observe the effect on the testee. Physical endurance is tested in a task where the testee has to climb a straight wall, weighted with various loads (42).

The testee is forced to repeat the most difficult task. For this repetition he is either cheered on or calmed down, depending on his personality (99).

(c) *Leadership Sample*. This test, known as *Führerprobe* or *Anleitungsarbeiten*, consists essentially in the task of instructing a group of soldiers, which is kept available for this purpose, in some mechanical task, as for example making a coat hanger out of a piece of wire. The testee has to explain the task clearly and demonstrate it. Another assignment may be to give a lesson on some well-known painting. Finally, he is asked to give a talk to the soldiers on some topic that interested him and find out by questions at the end to what extent he has succeeded in making the soldiers understand the topic (42). "Since men can influence men only when they show themselves adequate and free, the characterological examination reaches its peak at this point" (99).

Expression Analysis

(a) The evaluation of facial expressions is based on Lersch's (56) film approach. Moving pictures are taken in situations under stress. For example, the testee may have been exposed to electric shocks of varying intensity (42). The film record is taken without the subject's knowledge. The expressions are classified under eye, forehead, and lower part of the face. Based on Lersch's norms, the significance of each expression form for the total personality is determined. Variations of types of expression are classified under

degree of fullness, activity, tension, and innervation of expression, to each of which psychological meaning is attributed.

Facial expressions as observed during thinking are discussed by Schaenzle (91, 92, 93). He refers to Pideriet, Jaensch, and Werner (91). He finds that during thinking the region around the mouth furnishes particularly valuable cues. A small treatise on expression in general and personality, based on Jaensch, is presented by Fischer (24). The characterological meaning of body movements, such as scratching behind the ear, is presented by Strehle (119, 120).

(b) A good deal of attention is given to the observation and analysis of speech. Differences in loudness, pitch, melody, timbre, articulation, accentuation, tempo, and pauses are considered as indicative of differences in personality. Two papers deal with the speech forms that go with different personalities (15, 121). In addition to the phonetic aspects, the forms of expression, as choice of words and sentence structure, in conversation and lecture are studied (136). Also the literary style of the testee is taken into account (22).

(c) Finally, handwriting is evaluated on the principles set forth by Klages. Seventy-four per cent complete and 95% partial agreement between the results of graphological examination and those of the entire examination are reported (85, 86).

Life History, Interview

In the life history, data on environmental factors, schooling and change in school, social experiences, meeting of particularly superior or inferior persons, trips, attitude toward historical events, and similar items are noted (99).

The purpose of the interview (*Exploration*) is to obtain the candidate's point of view on his own past and future, to have him take sides on cultural matters, and to evaluate himself (13, 52). In this connection it seems worthwhile to mention that a monograph on Freud, Adler, and Jung (124) was announced as in preparation some time after the racial laws had become effective. The importance of the feeling of insufficiency is recognized (26). The use of interest blanks is also to be mentioned here (134, 135).

At the close of the examination period there is a round table discussion (*Schlusskolloquium*) on some topic by the candidates who have been tested together. Here the testees are observed with particular reference to ambition and competition. Finally, the examiner creates harmony and endeavors to dismiss each candi-

date with the feeling that he has been through an important experience in his life.

Directions as to how the final report of the psychologist should be written are given by Günther (38) and particularly by Masuhr (67). Parts of excellent case histories which seem to be taken from such reports are presented by Fischer and Ohnsorge (26). In review, these accounts are illuminating with regard to all stages of the examination and their interpretation.

SUMMARY

The literature on German military psychology has been brought together in a systematic manner and reviewed in order to provide the necessary background for an evaluation of the individual items. Even the more important articles in the field, many of them readily available, have heretofore received little attention, because as contributions to the science of psychology they were relatively insignificant. Seen in their proper setting, however, even the lesser articles deserve consideration.

German military psychology in all its branches is dominated by the characterological approach. The most important branch is selection. The method is always the attempt to place the testee in realistic situations where his entire behavior is rated with emphasis on personality. This rules out exact measurement; objectivity is attempted instead by requiring the agreement of several examiners in the interpretation of a behavior symptom before it is considered as indicative of a trait. Within the delimitation of the qualitative method the procedure is psychologically sound and is likely to be an effective selection device. Scientifically contested aspects of recent German psychology are ultimately left aside in selection.

The work in the fields of ethics, education, and morale is in accord with the current German philosophy.

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MORALE: A BIBLIOGRAPHICAL REVIEW¹

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During and immediately after the World War, with the nation first united in a common endeavor and then falling back into the more diversified pattern of normal life, the country and its spokesmen were highly conscious of problems of morale. Moral philosophers (42), psychologists (35), and other writers (32, 71) spoke of high morale not only as a wartime necessity but also as a desideratum for the normal civilian existence of the nation. Their hopes that morale would be a matter of general concern to psychologists have not been realized; except in studies of certain special groups (such as industrial workers and the unemployed) there has been little explicit attention to the problem. Now that many citizens feel that the established order of our society is threatened, and that common action is needed to thwart the dangers, there is a renewed interest in understanding and controlling morale. Hence it is appropriate to gather together for the attention of psychologists a list of publications which point to the problems needing study or provide facts or methods that might be useful in solving those problems.

The term "morale" has diverse meanings. A conference of 10 psychologists, gathered in Cambridge in the Fall of 1940, took cognizance of three different realms of discourse and formulated for each of the three a definition of "morale" which they considered useful as a guide to further work. The definitions they arrived at appear to the present author to provide an excellent basis for discussion.²

I. (The individual-organic emphasis.) The term *morale* refers to a condition of physical and emotional well-being in the individual that makes it possible for him to work and live hopefully and effectively, feel-

¹ I am greatly indebted to L. M. Hurvich, T. W. Huntington, and G. W. Allport, whose mimeographed "Beginnings of a bibliography on psychological factors in morale" provided a starting point for this review.

² These definitions are quoted from a report of a conference on psychological factors in morale, held November 2 and 3, 1940, under the auspices of the National Research Council, Division of Anthropology and Psychology. This report, mimeographed by the National Research Council, contains a number of significant brief reports and comments on psychological factors in morale.

ing that he shares the basic purposes of the groups of which he is a member; and that makes it possible for him to perform his tasks with energy, enthusiasm, and self-discipline, sustained by a conviction that, in spite of obstacles and conflict, his personal and social ideals are worth pursuing.

II. (The group emphasis.) *Morale* refers to the condition of a group where there are clear and fixed group goals (purposes) that are felt to be important and integrated with individual goals; where there is confidence in the attainment of these goals, and subordinate'y, confidence in the means of attainment, in the leaders, associates, and finally in oneself; where group actions are integrated and coöperative; and where aggression and hostility are expressed against the forces frustrating the group rather than toward other individuals within the group.

III. (Emphasis on individual-within-the-group on any specific occasion.) Given a certain task to be accomplished by the group, *morale* pertains to all factors in the individual's life that bring about a hopeful and energetic participation on his part so that his efforts enhance the effectiveness of the group in accomplishing the task in hand.

These definitions agree rather well with the consensus of usage found in the literature that is to be reviewed here, although the three realms of discourse are not always separated, and frequently one part of a definition is emphasized rather than another.³

For the purposes of this review, the subject matter will be divided into two main sections. In the first section we will deal with material falling under the strictly individual definition of morale. In the second section material falling under the second and third definitions will be considered together. The stress in the second section will be on the individual within the group (Definition III), for it is assumed that that is the approach psychologists would be likely to make to present problems of morale. Some of the previous publications which are relevant to research on the morale of the individual within the group, however, proceed from an almost strictly social definition of morale. Consequently, material related to Definition II will be discussed in the second section of this paper in so far as it bears on possible research on the social psychology of morale.

THE MORALE OF THE INDIVIDUAL

Methods of Study

The Clinical Interview. The concept of individual *morale* is very similar to that of the psychological *adjustment* of the individual to

³ Only two markedly different usages were found. Certain British writers (4, 37) use *morale* to refer only to completely internalized determinants of behavior; the term is then distinguished from *discipline*, which refers to conformity to external authority. The term *morale* as used here embraces both sets of factors. Zeleny (97) uses *morale* to mean the reciprocated personal likes within a group; in our usage, these would constitute one set of factors in morale.

his general surroundings. *Morale* may be distinguished from *adjustment* primarily in that it involves the orientation of the individual to future goals and generalized ideals as well as to the situation immediately confronting him. A state of high morale might be said to be a condition of good adjustment which includes effective and confident striving for conditions that will make for good adjustment in the future. It may be expected, therefore, that the clinical methods developed for the study of adjustment and for therapeutic purposes will be a useful technique in studying individual morale. An instance of the application of clinical methods to problems of morale may be found in a psychiatric study of the attitudes of tuberculous patients (83).

Rating. One method of quantifying data on the morale of the individual is for the investigator to rate the subject—that is, to estimate his position along a scale from high morale to low morale. Two examples of this method may be noted. In neither case is the rated variable defined as morale, but in both cases it is a condition of emotional well-being which might be considered as one factor in morale. Morgan, in a study of recipients of old-age assistance (68), rated “happiness” on the basis of five questions which were included in a lengthy interview. Hersey, in a study of individual workers (40, 41), used his own direct observation of the subjects for a rating of “general feeling tone.” Neither of these authors gives adequate attention to the question of reliability, and anyone who is planning to use this method will do better to refer to a good general discussion of rating such as may be found in Symonds (85).

Instead of obtaining qualitative data from the subject and then rating him, the investigator may have the subject rate himself. Examples of the use of this technique for obtaining measures of the individual's general state of feeling, which may be considered as one element in his morale, are to be found in papers by Bousfield (8, 9), Dysinger (24), and Johnson (46), among others. The rating sheet devised by Cason (16) might well turn out to be an excellent disguised measure of morale. There the subject is asked to rate his “customary and representative feelings” for different hours of the day, days of the week, and months of the year. The sheet has the appearance of an objective inquiry into mood-cycles, and the author deals with the results from that point of view. He mentions, however, that “total feeling scores,” derived by averaging an individual's estimates of how he usually feels at different times of the day, vary widely from person to person. Such a score might yield a highly reliable measure free from any distortion introduced by the subject's knowing that his morale was being measured.

Unfortunately, neither the author nor his critics (81) report on the reliability of the total feeling score.

Questionnaires and Scales. The Thurstone scaling technique, previously used for the measurement of attitude toward specific social objects,⁴ has been applied to individual morale by Chant and Myers (17). The continuum used by these authors is described as running "from extreme pessimism and depression to . . . extreme optimism and elation." The statements in their questionnaire are so phrased that the score would be likely to reflect a more enduring state in the individual and be less responsive to shifts of feeling, than would the ratings discussed above. The reliability of the test has not been reported.

Another device which has been applied to the measurement of individual morale is the type of attitude questionnaire advocated by Likert (57). The first application of the Likert technique to morale was made by O. M. Hall (36). In a questionnaire given to unemployed and employed engineers, he included five items which constituted a scale designed to measure occupational morale. Corrected coefficients for the split-half reliability vary from .69 to .84; retest after 30 days yielded a correlation of .63 with original scores.

The most widely used morale questionnaire is the one constructed by Rundquist and Sletto in accordance with the Likert technique. The construction and testing of their questionnaire are described by the authors in great detail (78). The content of the questionnaire is more inclusive than Hall's. An indication of the character of the 22 items in the scale is given in the authors' statement of their conception of morale:

The word connotes zeal, hope, confidence in oneself and in what the future will bring. It might be defined as confidence in one's ability to cope with the future. In addition there are symptoms that are commonly assumed to be present when one's morale is poor; distrust of people, the feeling that no one is friendly, and the belief that life is not worth living. All these are tapped by the present scale.

The Rundquist-Sletto scale has been used in investigating the morale of the unemployed (20, 78), of slum dwellers (18), and of college graduates (62, 63). The reliability of the test is fairly good; corrected split-half coefficients center around .80 (78). That the scale does not measure only a momentary condition of the individual is indicated by repeat reliability coefficients of .72 and .61 upon 60-day retest of groups of men and women, respectively (78).

⁴ The basic method is described by Thurstone and Chave (88), and a time-saving modification is presented by Seashore and Hevner (80).

Findings

The research instruments just described have not yet found very wide use. The few conclusions that may be drawn about characteristics and accompaniments of individual morale will be summarized here. It appears likely that the morale questionnaires and scales are measuring a more stable characteristic of the individual than are the ratings of momentary feelings;⁵ consequently the findings will be presented separately for the two types of measurement.

Ratings of Feelings

Cycles. Cyclical fluctuations in general feeling tone were found by Hersey when he made repeated ratings based on interview and observation. He presents graphs of average feeling tone in successive weeks for 10 factory workers (40, 41), showing a tendency toward cycles of fairly constant period in each individual, with the average period varying from three to nine weeks in different individuals. He also reports that cycles are found within the day and within the week (40) and presents graphs of average daily tone over a long period for two individuals (41, pp. 340-345). Johnson, using self-ratings by women college students (46), found clear evidence of cycles in only a few of her 28 subjects within the more restricted period for which she followed them (60 days).

Relation to Accompanying Behavior. Johnson used certain experimental procedures with each of her 28 subjects on one day when depression was reported and one day when elation was reported. Among experimental findings were markedly more spontaneous remarks by the subject, greater expansiveness of movements in writing, and quicker decision-speed in the euphoric state. Self-ratings on additional scales, including social confidence, social self-feeling, talkativeness, and decisiveness, yielded highly reliable differences in favor of the subject's reporting herself more outgoing and energetic on the euphoric day; the preliminary instructions were designed to minimize the possible effects of suggestion (46). Dysinger's subjects rated their physical condition at the same time as their feelings, and most of them showed low (but statistically reliable) positive correlations between the two scales (24). Hersey,

⁵ Studies employing ratings of feelings uniformly report marked fluctuations, if ratings are made for a single individual over a period of time. In contrast, it will be remembered that the Hall and Rundquist-Sletto questionnaires yielded a repeat reliability only slightly lower than the split-half reliability; comparable information is not available for the other questionnaires.

on the basis of intensive case study of 10 workers, constructs a picture of the concomitants of a high rating of emotional state. His picture corresponds closely to the definition of individual morale given at the beginning of this review. He also reports some increase in productivity and greater frequency and effectiveness of interaction with fellow workers (41). These findings are suggestive both of physical correlates and of the significance that state of feeling, as measured by the rating techniques reported here, may have for the morale of the individual as participant in the activity of a group.

Relation to Behavior and Events Reported to Precede the Emotional State. Bousfield obtained mood ratings from many subjects on a single occasion and simultaneously obtained data on their sleep. He finds that euphoria is negatively related to "the number of deviations during the preceding week from what the subjects reported as their usual schedules of retiring and rising" (8), and that it is positively related to the reported amount of sleep and to the rated quality of sleep obtained the previous night (9). Hersey found no consistent difference in his 10 subjects between the amount of sleep preceding their periods of elation and the amount of sleep preceding the same individuals' periods of depression (41). He believes in a basic physiological determination of the mood cycles, but argues from case histories that a variety of environmental events may affect both the magnitude and the duration of the fluctuations of mood (41). Explanations proffered by subjects for the occurrence of their emotional state are reported by Dysinger; the most frequently reported causes "of cheerful moods were social participation, past and present, and accomplishment in the tasks of the day. The most frequently reported causes of depressed moods were illness and the anticipation of work to be done" (24).

Morale Questionnaires

Findings on the relation of morale scores to other variables come from two sources. First, the same questionnaire may have been administered to different groups (such as employed and unemployed) or to the same group at different times (such as people living in the slums and later the same people after removal from the slums). Second, the questionnaires have usually been administered only as one part of a larger questionnaire, so that other data have been simultaneously obtained for comparison with morale scores. The most extensive study of the relation of other variables

to individual morale is that by D. C. Miller, based on the Rundquist-Sletto scale and reported in two recent articles (62, 63). Miller used a single group, 951 persons who returned a questionnaire which was sent to 1381 former University of Minnesota students who had left the University from 1 to 13 years before the time of the study (1937). For men and women separately, he selected the 100 who had the highest and the 100 who had the lowest morale score. Responses of these individuals on 435 other items in the very extensive questionnaire were then examined to see what variables were significantly associated with the difference in morale score. From the great mass of results that are reported, the present reviewer has attempted to select certain of the most significant and interesting findings, sometimes bringing together in a single generalization, as does Miller, results obtained from several related items. As each of these findings is mentioned, the relevant results of the other research projects known to the reviewer will be introduced for confirmation or comparison.⁶

(1) High morale is associated with *higher occupational level and higher income*. A possibly comparable finding is Chapin and Jahn's report that men on work relief have slightly (and unreliably) higher Rundquist-Sletto morale scores than men on direct relief (20). Morgan's finding that recipients of old-age assistance are happier if they have some form of work or useful work-like activity may also be related, if the explanation of this finding lies in the prestige and self-satisfaction brought about by useful work (68). But for more important confirmation, see the special case of unemployment in the next paragraph.

(2) High morale is associated with *economic security*. Miller's high morale group more frequently had steady employment and financial plans for old age than did his low morale group. This finding is amply and strikingly confirmed by comparisons between employed and unemployed groups in three other studies. Chant and Myers (17), Rundquist and Sletto (78), and Hall (36), working with their own measures of morale and using different groups of subjects, all report highly reliable differences in the average scores of employed and unemployed groups. Hall's results are the most conclusive, because his employed and unemployed groups

⁶ In Miller's study and in part of Rundquist and Sletto's, data are separately reported for men and women, and the findings differ at some points. The only findings to be reviewed here are those for men. For interesting comparative data on women, see the original publications.

were both composed of engineers and were matched on a large number of variables. The findings go even further in showing that economic security is the important variable here. Hall divides each of his groups according to reported conditions of economic security. Men who were employed but who "anticipated being laid off almost any time" had a lower average morale score than those who, though unemployed, were in no immediate need of financial help. Men who are employed but "sometimes feel anxiety that they may be laid off" are not very much higher on the scale, while those who feel that their jobs are secure have an average morale score far above that of all the other subgroups. A similar relationship of morale score to reported certainty of maintaining or obtaining employment was found by Rundquist and Sletto among both employed and unemployed.

(3) Morale is related to *age*, but only through some intermediate consequence of age. Miller's college graduates were more likely to have high morale if they were over 30—probably because a higher proportion of those over 30 established themselves before the depression and had economic security. Rundquist and Sletto found the opposite relationship in men on relief, perhaps because the older a man is the less confidence he feels in ever getting a job again (78). Among students (in high school, college, and evening school), Rundquist and Sletto found over-ageness associated with low morale, presumably because it makes for feelings of failure and difficulties in social relations (78).

(4) Morale is associated with a variety of *living conditions*. Miller found high morale associated with marriage, but perhaps because of the greater age of the high morale men. In students, Rundquist and Sletto found that high morale was related to living at home and having an intact family (78). Morgan found that in recipients of old-age assistance happiness was associated with pleasant social and emotional relations with friends and relatives, and with living in one's own home (68). Chapin found a slight and statistically unreliable improvement in morale score when slum dwellers were retested some months after moving out of the slums (18).

(5) *Conformity*, exemplified in Miller's study by the subject's having a job that his family members approve of and by his holding conservative political attitudes, tends to go with high morale. Hall found that high morale was associated with favorable attitudes toward employers and religion, both perhaps indices of conformity (36).

(6) Association of high morale with *deep religious convictions* is reported by Miller, and some correlation in that direction is indicated in the finding just reported from Hall.

(7) Men with high morale give a number of responses which may be summarized in the statement that they tend to use *realistic techniques* in seeking social advancement and to make a realistic problem-solving response to difficulties, as compared with an opposite tendency towards wishful thinking.

(8) Miller finds high morale associated with a high rating by the individual of his *enjoyment of leisure activities*, although not with the number of leisure activities in which he engages. Morgan found that old people with hobbies and outside interests were happier than those without (68).

(9) Men with high morale tend to be *less intelligent*. "40 per cent of the low morale men had college aptitude scores placing them in the upper thirty percentiles of their class. Only 19 per cent of high morale men were in these percentiles."⁷

(10) In Miller's study, *education* was nearly constant. Rundquist and Sletto found in evening classes, and in day classes for the unemployed, a slight and unreliable tendency for the best educated to have higher morale. When men on relief were divided into two groups according to whether they had gone beyond the ninth grade, there was a highly reliable difference in average morale score, high morale being associated with more education (78).

(11) Miller apparently did not find health to be significantly related to morale. Morgan found that in the aged (where health and disability are more frequently a problem), happiness was related to health (68).

MORALE OF THE INDIVIDUAL AS A MEMBER OF A GROUP

Methods of Study

Questionnaire and Rating Methods. The rating procedures which have been applied to the measurement of temporary emotional state and the questionnaire techniques which have been used for quantifying the optimism-pessimism of the individual could all be applied directly to the study of the morale of the individual in the group. The rating method has been used for practical purposes to measure features of the individual's interaction with his group which clearly fall under the scope of morale; as an

⁷ The critical ratio of this difference in proportion is 2.7. In women, the difference is negligible.

example, the use of ratings in the army efficiency system may be cited (70, pp. 332-362). The investigator does not know of its use in published research in this field. The questionnaire technique is applicable wherever the morale of the individual in a particular group can be defined in such a way that items can be constructed, varying responses to which will represent different degrees of morale.⁸ The morale of individual workers as employees of a particular department store has been measured by a questionnaire devised by Kolstad (53). In a questionnaire about to be published, Harding seeks to measure a number of factors⁹ in the morale of the individual citizen of this country in relation to the broad task of national defense (38). All of these questionnaires are of the general type espoused by Likert. The Thurstone technique of scale construction has been used by Uhrbrock to measure the attitudes of industrial employees towards company management and its policies (90) and by Whisler and Remmers for a generalized scale to measure an individual's morale as member of any group (94, 95).

These quantitative methods are probably of great value where the significant variables in morale are well enough recognized, clearly enough defined, and constant enough from person to person so that they may be measured by such objective techniques. But in the study of the individual's morale as a member of a particular group aiming towards certain goals, they can obviously be at best only one of several methods of gaining information, for they do not in themselves provide the knowledge about the social situation that is needed in interpreting the results. Hence it is necessary to turn to methods more appropriate for the study of the social situation.

Sociometric Techniques. Moreno (66) has devised certain techniques for determining the structure of small social groups and has given to them the name "sociometry." The basic technique is to ask each member of the group to express an attitude towards his individual fellow-members. The exact procedure may be varied to suit the circumstances: students may be asked how they would feel about working with each of their classmates in a discussion group, settlers in a new community may be asked whom

⁸ In case a significant index of morale may be obtained from the response to single questions, the public opinion poll is a highly useful technique. Its use is almost essential if data on a representative sample of a large population are required for the purpose at hand. A discussion of the poll technique is given by Gallup and Rae (31).

⁹ Individual morale as measured by the Rundquist-Sletto scale (*vide supra*) appears here as one of several factors.

they would like to have as a next-door neighbor, and soldiers might be asked whom they would like to have in their squad. Graphic methods may be used very conveniently to plot the structure of the relationships found within the group. If the extent to which interpersonal relations are characterized by reciprocated positive attitudes is taken as one factor in morale, then quantitative measures of this factor both for the group and for the individual may readily be derived from the sociometric data (97), and such measures have been found to have a very high reliability (98). An excellently annotated bibliography of studies employing sociometric techniques is presented by Franz (28), and some more recent studies are included in a critical review by Chapin (19).

The sociometric techniques as generally employed distinguish only two or three degrees of relationship between individuals (*e.g.* acceptance, rejection, indifference). It may be helpful to combine with them a more finely graduated scale for social distance, such as that devised by Bogardus for measuring attitudes towards nationality groups but also given a wider application (7).¹⁰ Suggestions for improving such scales may be derived from the recent paper by Gurnee and Baker (34), and an interesting speculative analysis of psychological conditions underlying what they measure is given by Dodge (23).

Clinical Methods. Clinical methods of detailed personal interview are best known for their use in the study of individual adjustment. They have, however, found use in several studies of the morale of factory workers. Kornhauser and Sharp used the personal interview along with a questionnaire (54). A rather unguided form of interview was the principal procedure employed by Hall and Locke in a study of incentives and contentment of workers in an English chocolate plant (37). For an appreciation of the potentialities of this technique, Roethlisberger and Dickson's report of the long-term study at the Hawthorne Works of the Western Electric Company should be consulted (77). In this project a directed interview was first employed, but as the result of experience a more and more unguided interview was adopted. The use of this technique (plus observation) allowed an understanding of the psychological and social background of industrial morale which far surpasses the outcome of any of the studies which restrict technique

¹⁰ A step in this direction has already been taken by Newstetter and his associates in their independently developed use of sociometric techniques (72). Their work is also of interest for its successful validation of these techniques against data obtained by observation of behavior.

to the more objective and less time-consuming questionnaire. There could be no better methodological starting point for a future study of morale than Roethlisberger and Dickson's sound description and evaluation of their procedure and the results they obtained.

Observational Methods. Observational methods are likely to be of great value in the study of morale. Many of the articles by military men on soldiers' morale, to be referred to later in this paper, are apparently based on an accumulation of observations in the course of practical experience, and some of them give the impression that the authors have been very successful in discovering the major factors involved. Systematic observation directed towards gaining information about morale is likely to be even more fruitful. A notable example of its successful application is to be found in the Western Electric study, particularly in Part IV of Roethlisberger and Dickson's book (77). In that study an observer was present in the workroom in the explicit role of investigator. In cases where investigation might disrupt the morale of the group, or for other reasons appears undesirable, systematic observation by a person who is participating in the group in some other role may be the only suitable method of research. It is a well-known technique in field work in the social sciences, although the participant observer is usually known to be an investigator; for a clear statement of the technical problems involved in its use in a sample research, see Kluckhohn (52). Participant observation was one of the methods used by Lazarsfeld and Zeisl (55) in a study of morale in an unemployed village, a brief report of which is given in English by Lazarsfeld (56); an instructive illustration is provided there of the diversity of roles that may be required for getting the desired information from people who are not interested in being studied.¹¹

The reviewer would urge particularly the probable fruitfulness of the clinical and observational methods. The questionnaire, rating, and sociometric techniques have the advantage in quantification and in freedom from the investigator's bias. They may be

¹¹ Where a situation renders difficult the direct observation of daily behavior, the state of morale may usefully be studied by taking note of conditions which depend in part upon morale and which therefore may constitute indirect indices. For example, in a military organization a large number of requests for transfer from one unit to another might be an indicator of low morale. The possible use of such indices in the study of industrial morale is described and evaluated by Blankenship (6).

of great use where the situation is well known and the research objectives sharply limited. The clinical and observational methods have the advantage of providing a wealth of knowledge about the particular situation and of leaving wide open the road to the discovery of unsuspected facts. They may be used in many situations where application of the other techniques would be difficult or impossible. Finally, the investigator who uses them is kept in close touch with the human beings he is studying and is not likely to become so exclusively devoted to perfection of a research technique that he forgets the research problem that he started out to solve. All these considerations may weigh very heavily in the planning of any research that the psychologist is called on to do in a period of national emergency.

Findings and Problems

Factors affecting the morale of the individual as a member of a group may be expected to vary widely according to the character of the group and its aims. For this reason, empirical findings will be reported separately for each general type of group that has been studied.¹² In each case a brief summary will be given only of those empirical findings which are most likely to point to factors in the morale of other groups as well—that is, which are most likely to be suggestive for future research in the morale of any group. For all groups there is a scarcity of scientific studies to be reported on; in the case of military groups and wartime civilian groups more casual observations will also be reported, therefore, in order to point out further the problems that need study.

Groups of Children and Adolescents

Studies have been made of the morale of groups of children and adolescents in three different settings: clubs, public school classes, and institutional cottages. Three conclusions of general interest may be drawn; the investigator has found no studies which report

¹² Data in some way relevant to morale are obviously available for innumerable types of groups. The survey here is limited to those groups (a) for which the most reliable results are available or (b) in which psychologists are likely to be most interested at present. The report on competition and coöperation by May and Doob (61) summarizes some relevant findings on other types of groups, including clubs and associations, utopian communities, economic coöperatives, government employees, and the citizens of the Soviet Union. Another useful bibliographical source is Vaughn and Diserens' review of the experimental psychology of competition (91).

contrary findings, but it must be remembered that the data are too few to allow any guarantee of certainty in these conclusions.

(1) Morale is heightened when groups are so arranged that members are in contact with persons whom they like and who like them. In the fifth grade of a public school, Kerstetter and Sargent reassigned seats on the basis of preferences expressed in a sociometric test; they claim beneficial effects upon morale, but had no controls (51). Two studies at the New York State Training School for Girls are more conclusive because of the use of control groups. In one, newcomers to the school were assigned to cottages according to mutual affinity with the established leaders; their subsequent relations to the group were compared with those of other newcomers assigned at random (45). In the second study, sociometric methods were used to arrange the seating of cottage residents at meals to give maximum mutual affinity among tablemates; subsequent relations among the members of the group were compared with a cottage where seating was left to the girls (67). In both studies, a marked advantage in morale was found for the groups whose membership was arranged for mutual affinities.

(2) Morale is improved when discipline is imposed by the group rather than by its adult leaders. This conclusion is reached by two authors who have experimented with the management of children in institutional cottages (48, 50, 69); their observational findings appear to be well justified for the groups on which they report.¹³ Both authors argue that, when discipline is imposed democratically by the group as a whole, the individual member perceives more clearly the advantage to himself of maintaining the social organization and not acting to the detriment of fellow-members.¹⁴ Similar conclusions were reached in Lippitt's extensive experimental study of social organization in boys' club groups (59).

(3) Participation in organized group activities may improve morale. This statement, while it seems certain enough from general observation, has apparently been demonstrated in only one carefully controlled study. Kephart had at his institution for high-grade mentally defectives two cottages of similar character but differing widely in morale. The low-morale group was subjected each day for five months to one extra activity which required organized group participation, and at the end of the period

¹³ Mowrer (69) cites Haynes (39) as reporting similar findings in studies of institutionalized criminals.

¹⁴ In another paper (49) Kephart indicates that at least one attempt to improve the morale of a cottage by self-determination was a failure.

there was a marked improvement in morale as determined by sociometric techniques and by a number of observational criteria (49).

Marital Couples

Two people are necessary for the smallest possible social group. A marital couple form a group which begins with just such a size, and the morale of husband and wife with respect to their joint aims and activities is an important subject of investigation. Scales have of late been devised (10, 87) for measuring marital adjustment or marital happiness. Although these scales include some questions that do not directly indicate morale, they do, on the whole, correspond closely to a scale which might be devised to measure morale as defined at the beginning of this paper (Definition III). Several very extensive studies have dealt with the correlates of marital adjustment as measured by these scales. While many of the findings are obviously specific to the marriage situation, certain ones may be cited for their possibly wider significance. Burgess and Cottrell find that from a knowledge of premarital background the marital adjustment score may be predicted with the accuracy indicated by a correlation coefficient of .51.¹⁵ Among the variety of generalizations they make is the statement that it is the previously well-socialized person, characterized by stability, conventionality, and conformity, who most readily adjusts in marriage; he has been molded by successful participation in our social institutions and is prepared for participation in the specialized marital group (10). Confirmation of this conclusion may be found in the Terman volume (87), where the author reports on a number of other personality correlates as well and argues that generalized predisposition to happiness or unhappiness is an important determinant of marital adjustment. These studies both suggest the possibility of predicting with reasonable success, after thorough study, the chances that any individual will have high morale as a member of any new type of group of which he becomes a member; they also give hints as to what some of the predictive factors might be. Also suggestive of more general significance is the finding by Kelly that, when married people are asked to rate themselves and their mates on a number of desirable personality

¹⁵ This coefficient is spuriously high because the background items were weighted according to the differentiating value they were observed to have in relation to marital adjustment for the population on which the coefficient is based.

traits, "the typical husband or wife who considers himself very happily married tends to rate himself above average, but to rate his spouse still higher than himself" (47).

Acculturating Groups

Psychologists who consider at a distance the spectacle of nations forced by a dominant power to make drastic changes in their ways of life may well remember that other societies have been forced to make even more drastic changes. From the study of behavior in primitive groups which are experiencing the impact of Western civilization, some clues might be gained about factors in the morale of nations. One has only to read in sequence accounts of the acculturation of seven different American Indian tribes, as provided in a volume edited by Linton (58), to see how differently various tribes react and how greatly they must vary in morale. But why the differences? A detailed analysis of existing knowledge on this point at the sociological level might suggest answers, but it cannot be attempted here. Psychological analysis of the morale of primitive groups in acculturation has apparently been attempted only by Erikson (27) and by Sachs (79), and it is difficult to draw generalizations out of their reports. The tentative generalization might be made that, where members of an acculturating group have low morale (with respect to the goals both of their own and of the other group), the tendency of the dominant group to provide them with many significant punishments and few significant rewards, while the capacity of their own group to provide rewards is greatly diminished, is likely to be the cause.

Industrial Workers

It is with reference to industrial workers that morale has been most extensively discussed by American psychologists. Yet there have been disappointingly few concrete studies from which generalizations of wide applicability are readily drawn. As May and Doob point out (61, p. 73) with reference to determinants of productivity, a number of studies have found each of a variety of variables to be the decisive one in the particular situation investigated. For well-balanced consideration of a number of variables and their interrelation, and for an expertly described picture of their functioning in several concrete industrial situations, Roethlisberger and Dickson's volume is to be most highly recommended (77). The study by Hall and Locke is similar in approach and in

findings, but is deficient in concrete material (37). Viteles provides a well-documented summary of earlier investigations (92, pp. 560-628); his review is supplemented by the more recent publications of Hoppock (43, 44) and Watson (93). Excellent general descriptions of factors in industrial morale are given by Burt (13, Chap. VII) and by Strong (84, pp. 579-602), but without adequate documentation. Methods of research have been summarized and critically examined, with special reference to industrial morale, by Blankenship (6).¹⁶

The most valid generalization that can be drawn from the literature is that a number of interrelated variables are operative to determine industrial morale, and that an adequate study of any particular situation should take into account as many of them as possible. Among the variables whose influence has been most frequently noted and which are most likely to be found in other than industrial situations are the following:

- (a) Financial incentives;
- (b) Relation of the individual to his superiors;
- (c) Relation of the individual to his fellow-workers (including friendships, enmities, status, etc.);
- (d) Opportunities to remedy sources of annoyance or frustration, or at least to express the annoyance;
- (e) Individual personality, abilities, and skills;
- (f) Events in the individual's life outside.

For developing sensitivity in recognizing these and other variables in concrete situations there could be no better preliminary exercise than a careful study of Roethlisberger and Dickson (77).

Military Groups

It is with the morale of military groups that the psychologist may be most vitally concerned in the near future. Certain military writers have pleaded the urgent necessity for making use of modern scientific psychology in dealing with practical problems in the morale of the armed forces (11, 22, 73). The psychologist is likely to recognize, on the other hand, as do a group of British scientists (3), that he has no simple facts or principles with which he, in his academic castle, can solve those problems. He may have gained an improved understanding of human behavior which, if communicated through deliberate training, could be of use to military lead-

¹⁶ The related problem of the morale and incentives of civil servants has been examined by May and Doob (61, pp. 71-78).

ers in carrying out their aims efficiently.¹⁷ But the pressing need is for concrete research, in the military situation, on psychological factors affecting morale, as has been well recognized in the writings of both military men (2, 22) and scientists (3).

At present there are apparently, at least in the English language, no reports of systematic research on conditions affecting the morale of soldiers. There are, however, a number of published observations and comments, both by military writers and by psychologists with military experience, that are well worth drawing together.

A first question might well be: Why is there any special problem about military morale? In any group working towards a common end, morale may be high or low; so much is at stake for a society in the morale of its armed forces that it has reason to be vitally concerned with the problem there. There are reasons, moreover, to expect special difficulties to arise with the morale of military groups. Army life is a distinct subculture whose requirements differ widely from those of the general culture of the society. The extent of the differences may vary; Hall asserts that the break is greater here than in Germany because the American civilian is not accustomed to the rigid hierarchy that characterizes the army (35). If, as is frequently claimed (2, 3, 73, 74), a high degree of individual initiative is required in the modern citizen army, especially when it uses the newer tactics, the break must be less than it has been in the past. At any rate, army life is marked off by at least four major characteristics:

- (1) One of a soldier's functions is to kill other human beings.
- (2) A soldier is required to place his health and life in unusual jeopardy.
- (3) A soldier is subjected to a number of special deprivations.
- (4) A soldier is required to conform to a number of special conventions and to acquire certain special skills and knowledge, which assist him, or are believed to assist him, in performing function (1) and in maintaining his morale under conditions (2) and (3).

The existence of a military group requires that individuals be

¹⁷ An American naval officer reports that each regiment in the Nazi Army has attached to it in the field a psychological officer who has undergone a special six-months training course (96). Munson, in describing the morale work in the American Army from 1918 to 1920, says that a knowledge of psychology is important for morale officers, but whether they received any psychological training is not indicated (71). In the case of industrial morale, Moore (65) reports experimental projects in leadership training, in which it is claimed that the ability of foremen to maintain workers' morale was aided by training in psychology.

taken from their accustomed setting in the society in which they have been socialized and be resocialized into conformity with the military subculture. The difficulties of resocialization may be less in the professional army, which has a continuous existence and gradually inducts and trains a few individuals. The difficulties are likely to be greater, and the problems of morale more diverse, in the large citizen army, for there a mass of individuals are brought at once from the larger society with nothing in common but their citizenship, and this mass of individuals must be formed into a group which will conform to the military subculture (73). What are some of the conditions which will need to be investigated if the morale of such an army is to be adequately understood? The morale-disrupting characteristics of army life will first be reviewed at greater length, and then some of the major factors making for improved morale.¹⁸

Conditions Making for Low Morale

Reaction to Killing. In civilian society the deliberate killing of other human beings is fully permitted only to executioners, and for other people in almost all circumstances it is heavily sanctioned. The prospect or the act of killing would therefore be expected to arouse considerable guilt in most men. It is true that some may welcome the opportunity and that for everybody impulses which were formerly repressed may now be expressed (22). But it seems likely that guilt is a significant part of the reaction in nearly everyone and that guilt is detrimental to the individual's morale in carrying out his tasks as a soldier. Yet only one of the writers reviewed makes this condition explicit (75). Investigation as to the prevalence and modes of adjustment to guilt may need serious investigation.

Reaction to Danger. The soldier in an offensive must take forward action which frequently increases greatly the chances of his being killed or wounded. In a sense the whole purpose of military training is to train into the individual incentives that will work counter to the fear which such action arouses and work strongly enough to make him face the danger (26). Most of the conditions of morale listed below are among the factors contributing to those

¹⁸ The factors listed here are those which have been generally asserted to be influential for the morale of soldiers in combat and of soldiers training for combat. It is likely that the relative importance of these factors will be very different, and other factors may be predominant, in the morale of soldiers in peacetime or of soldiers who do not see any immediate prospect of fighting.

incentives. Fear is also a problem for morale during periods of inactivity. Some degree of fear or anxiety is needed as an incentive for taking adequate measures for security (2, 35). But if the anxiety becomes too great, the desire to escape it as well as the prospective danger may become overwhelmingly strong, and morale is destroyed (4). Such an outcome can result in complete military defeat (25, 30, 71). Hence, for the maintenance of morale prolonged anxiety as well as momentary fear must be dealt with.

Deprivations. The soldier is likely to be partially or completely deprived of sexual satisfaction, physical comforts, his normal social relationships, and a variety of gratifications obtainable in civilian life. There will be some individuals who will welcome severance from their accustomed ties (76), just as occasional persons welcome tuberculosis (83). But for most soldiers these deprivations are likely to lead to tensions injurious to morale (22).

Required Conventions and Activities. The special conventions and activities of army life are generally presented as contributing positively to morale (11, 12, 25, 73, 76). It should be recognized, however, that these requirements also restrict the individual, produce tensions and hostility, and may be detrimental to morale.

Conditions Making for Heightened Morale

Reduction in Any of the Above Conditions. One way of improving morale would be to reduce where possible the intensity of any conditions which tend to lower it. It has been argued that much of conventional army discipline and drill is a nearly functionless survival and should be abandoned for the sake of improved morale (3). Under appropriate conditions, deprivations might be lowered by allowing leave, by providing greater comfort, by encouraging relatives and friends to write letters (2, 29, 71). Danger may be temporarily removed by leave from the front (22), although it has been claimed that relaxation between periods of fighting is demoralizing (4). Fear-arousing thoughts may be reduced by not emphasizing to soldiers the destructive power of weapons (21) or by showing that the risks are much less than they may think (3). Guilt may be less if the individual does not see the results of his fire (75). But the basic morale-disrupting conditions of military life cannot be entirely eliminated.

Fear of Not Obeying. The fear of social disapproval can become a very powerful motive in human beings, as exemplified by the efficacy of civilian disapproval in getting men to enlist during the World War (76). It is believed that one consequence of group drill

is a progressively increased sensitivity of the individual to the disapproval of his fellows (12). In addition, discipline from above involves in some cases disproportionate punishment for small offenses, which develops a strong fear of disobeying superiors (76). If successful, such training makes the fear of disgrace greater than the fear of death (26). It may not be successful, however; hence the soldier is taught that flight leads to court-martial and that at critical times his choice is between going forward with a chance of survival and going back to the certainty of instant death (25, 75, 76). It is recognized that while this negative discipline may force the soldier over the top, it does not make him take the risks or the active attitude that may be essential for good fighting (76).

Attitudes Towards Superiors. Habits of obedience to superiors are built up during training (4, 12) and reinforced by awareness that one's fellows also obey (12). Such habits are essential to morale, but if too strong they may be detrimental where operations call for great individual initiative (2, 74). It is frequently asserted that the soldier's attitude toward his leader may also provide a source for positive desire to go forward in the face of danger. Hero worship places an emphasis on the positive side, on what should be done (4); hence the military leader "must supply the care and guidance to his men that every human seeks and thus make an associative shifting of allegiance from the father image to himself" (73), and, having established hero worship, must by example lead his men to want to do what is necessary (22, 73). That a somewhat childlike trust in the leader would be conducive to morale during inactivity is rendered more plausible by Mira's observation that during air raids in Spain the children were frequently more tranquil than the adults (64). These statements, it may be seen, only begin to get at the characteristics of good leadership, which is frequently said to be the crucial determinant of morale (26, 70).

Pride in Group Membership. Another factor that may drive the soldier on to perform his tasks despite dangers is a relationship with his regiment, division, etc. such that he feels that victory is a reward for the group even if he dies and that if he survives the personal gain of respect from his group is a great reward (12, 73). It is largely to this end, it is asserted, that a number of conditions are set down which are likely to encourage the unity of the group, e.g. uniforms, insignia, parades and reviews, colors, close-order drills, mass singing, and the provision of subjects of common conversation such as unit athletic teams (12, 73, 96). How powerful a

motive this pride in group membership will become depends partly upon the status which soldiers are accorded by the civilian population (22). The development of group unity is facilitated by initial homogeneity, and it has been asserted that the differing nationality background of Americans poses a problem here (25, 35).

Relations With Immediate Fellows. Comradeship in the small group of immediate associates has been said to be very important for morale (22, 76). Congenial relationships must greatly reduce the boredom of routine work (32) and the tension of periods of inactivity. Security is reported to be enhanced by acquaintance with members of the group and through being accustomed to work with them in training; it is urged that men who train together also fight together (2, 3, 35). It may be that the immediate clique is even more important than the larger group in the development of incentives to go forward against danger. Experiments reported earlier on the deliberate rearrangement of cliques for the improvement of morale among children and adolescents might well suggest a most fruitful technique for improving army morale. In an article by an American naval officer brief mention is made of a similar procedure carried out in the contemporary German Army. The psychological officers there, it is reported, "understand the psychological and social problems of the men. They have reached the point of placing in the same regiment men who are congenial, who are interested in the same arts and crafts! The High Command feels that the results are astounding" (96).

Other Sources of Positive Incentive. There are other conditions which may encourage positive incentives in the soldier. Among them is the conferring of medals and decorations (35), but, as Phillips points out (73), such action must be taken quickly if it is to have any significant effect on morale. The prospect of life after death or of social immortality may be influential, although Hall reports that the former was not very important among American soldiers in the World War (35). Of supreme importance is belief in the cause that is being fought for (3, 4, 76). There are psychological problems of persuasion involved here, as is illustrated by the functioning of political commissars in the armies of the U. S. S. R. and the Spanish Republic (74). But in much larger part the problems are of social facts, the structure and leadership of the nation and the situation it confronts.

Skills and Knowledge. The development of skill in the technique of offense and defense is likely to be of obvious help in developing the individual's confidence as well as simply making him

more efficient (21, 25, 35). It has been suggested that physical exercise has a similar effect in leading to confidence in one's body (25). The importance of the soldier's knowing as accurately as possible the risks he is undertaking has been urged, on the grounds that an uncertain fear is the worst (35, 60).

Humor. The importance of humor in the maintenance of morale is recognized by several writers (32, 35, 71), but nowhere does it receive adequate attention.

Most of these conditions of military morale involve learning—the learning of new skills and new motives. Among psychological principles that will be useful in the study of morale, therefore, are those of learning and motivation, and the accompanying review of those principles is highly relevant to the future study of military morale. The contemporary psychologist is also at an advantage in having at his command, as the result of community studies during the last two decades, a much better understanding of the soldier's civilian background and his primary socialization than has generally been available in the past.

Civilians in Wartime

The morale of civilians in wartime seems to have received even less systematic attention than that of soldiers. The increasing military significance of the home front has brought greater concern with this problem of late. The British government in the present war is reported to have used the poll technique and more qualitative techniques of interview and observation in order to determine the morale of their own population (3). If the United States can be said to have had definite national aims during recent years, then many of the attitudes determined by American polls are relevant to civilian morale.¹⁹

The situation of the civilian in modern warfare is that of being faced with some of the same deprivation, danger, and regimentation that the soldier undergoes, but not having positive skills and opportunities for combating dangers and releasing tensions. Recent British writers stress the importance of providing activities of some sort and particularly of bringing as nearly as possible every person into some organization which will provide him with clear-

¹⁹ The results of both Gallup and *Fortune* polls are conveniently accessible in quarterly summaries published in *The Public Opinion Quarterly*, beginning with the issue of March, 1940. Trends in attitude towards the war are summarized and interpreted by Cantril and others (14, 15).

cut duties related to the achievement of war goals (5, 33, 82). The most frequently discussed problem is the unity of the population and its confidence in the national leaders (75, 86).

The psychological literature is most meager of findings with respect to the problems of civilian morale. It is to be hoped that psychologists will seize the opportunity to extend and apply our understanding of these and other problems that have been reviewed here.²⁰ When they do so, the techniques of research and the findings that have been summarized throughout this paper should prove to be of considerable use. In addition, the psychologist's general knowledge of learning, motivation, and group behavior must be called on. When particular civilian groups are considered, moreover, the nonpsychological literature may provide a great deal of relevant information which will shorten the preliminary phase of an investigation. Meanwhile, certain psychologists have sought to contribute to national morale in another immediately practical way. Apparently acting on the assumption that positive social aims are essential for good morale, Allport (1) and Tolman (89) have applied their psychological background to the definition and support of the aims of American democracy.

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²⁰ A useful beginning in this direction is made by G. W. Allport in an article, "Morale: American style," which appears in the magazine section of *The Christian Science Monitor* for April 26, 1941. He makes an important distinction between *segmental* morale—the hysteric type that mobilizes only certain segments of the personality at the risk of severe conflict with other segments and a debilitating guilt reaction—and *integral* morale, in which the whole personality is sufficiently at one to allow devotion to critical social goals without conflict or recoil. He urges the need for, and the promise of, integral morale in our democratic citizenry and emphasizes the necessity for positive social goals which may be of a revolutionary character. Among the influences endangering American morale, he holds that the following are the most menacing: the cynicism of the deadly parallel, desire for submission through weariness, dissolvent propaganda, and the profit habit.

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MOTIVATION AND LEARNING IN RELATION TO THE NATIONAL EMERGENCY

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Any emergency, whether in the life of an individual or a nation, calls for energetic action. If the emergency has been anticipated and prepared for, more or less appropriate responses can be made without delay. But if such has not been the case, appropriate action must necessarily be postponed. At the present time national concern is centered principally upon our lack of war matériel, but behind this lack of physical preparedness is a basic human problem, namely: the fact that we do not have an adequately trained personnel either to produce or utilize the paraphernalia of modern warfare. This means that the nation is faced with the stupendous task of immediately training millions of men and women for efficient participation in novel activities of both a civil and military nature.

Although the present emergency thus makes phenomenal demands for new learning, this learning will necessarily follow old principles. The basic mechanisms whereby human beings acquire new skills and habits are presumably the same in wartime and peace. On this assumption the present paper will be devoted to a summary of contemporary psychological knowledge of the learning process in general, with only incidental reference to the particular problems of application which inhere in the emergency situation. In so far as possible, controversial issues will be avoided in favor of a systematic, dynamically integrated view of the learning process as a whole. Only agreements can provide the basis for concerted action, and it is these that will here be sought and stressed.

As Sherrington (36) long ago pointed out and Ladd and Woodworth (26), Craig (10), Williams (44), Tolman (40), and others have reiterated, all functionally significant behavior falls logically into two major categories: responses that may be said to be *consummatory* and responses that may be said to be *anticipatory*. It is no accident, therefore, that learning theories have tended to arrange themselves in two corresponding groups, according to whether their proponents have been interested principally in behavior of the one sort or the other.

CONSUMMATORY BEHAVIOR

For one group of investigators, interest has centered in the learning that occurs when a given organism finds itself in a "problem situation." Such a situation is usually defined as one involving a *motive* (drive, want, need), *i.e.* any more or less intense stimulus (or stimulus compound) impinging upon the organism from within or without, some *barrier* which prevents the direct and immediate reduction of the motive in a pre-established manner, and the occurrence of *varied responses*, which (at least in man) may take any of several forms, "going around," "looking around," or "thinking."¹ If one of these varied, or "exploratory," responses—some writers (25) have called them "hypotheses"—provides a means of circumventing the barrier and of reducing the motive, this response is said to be "correct," "right," "successful," "consummatory." Learning is said to be manifested to the extent that the organism, on successive trials, makes the "right" response to the problem situation with increasing directness and promptness. This process has been carefully studied and described by Thorndike (37), Adams (1), Shaffer (35), and many others.

Thorndike's "Laws of Learning." From the empirical observation of various types of problem-solving behavior, Thorndike originally formulated two principles, or laws, which he believed to be generally valid. The first of these, called the Law of Use (Exercise, Frequency, Repetition), was as follows:

When a modifiable connection is made between a situation and a response, that connection's strength is, other things being equal, increased (38, p. 2).

It is almost axiomatic that if a response does not occur (either symbolically or overtly) it cannot be "learned." In this sense, therefore, the repetition of a response is a *necessary* condition for the occurrence of learning. James (23) and the earlier philosophical writers whom he represented seemed to feel that repetition was, in fact, a *sufficient* condition for learning; and it may have

¹ It has sometimes been assumed that the response variation which occurs in a situation of this kind is essentially "random." Koffka (24) and other Gestalt writers have been quick to point out that response variation has order and organization. Miller and Dollard (30) have recently discussed this problem in terms of "response hierarchies." Cf. also Shaffer (35). Freud (17) and psychoanalytic writers in general have likewise stressed the "psychically determined," *i.e.* the nonrandom, nonaccidental character of behavior. It now appears that the expression "random responses," as a synonym for response variation, was an inadvertence on the part of earlier writers and can be advantageously dropped.

been, in part at least, out of deference for the past that Thorndike initially attributed so much significance to this factor. But subsequent developments have shown that its importance has been greatly overestimated. Dunlap (14), Adams (2), and, at a later stage, Thorndike (39) himself, have shown that although repetition, or "use," is a necessary condition for the occurrence of learning, it is not a sufficient condition. As Dunlap has pointed out, repetition may either strengthen a given stimulus-response sequence, weaken it, or have no effect (see discussion of *Extinction*, pp. 428-429). The critical factor in learning is clearly of another kind.

Thorndike's second learning principle was the well-known Law of Effect, which he stated as follows:

When a modifiable connection between a situation and a response is made and is accompanied or followed by a satisfying state of affairs, that connection's strength is increased: When made and accompanied by or followed by an annoying state of affairs, its strength is decreased (38, p. 4).

This formulation has been often criticized because of its "hedonistic" implications; but the first half of the statement, however worded, embodies a basic fact that has not been successfully controverted, namely: when an organism is in a problem situation, the factor of "success," *i.e.* motivation-reduction, is crucial in determining what particular response will become habitual. The first half of the Law of Effect says, in other words, that organisms tend, when in a problem situation, to make with increasing directness and promptness those responses which provide "solutions" to the problems which they face. There can be little disagreement as to the descriptive accuracy of this statement.

As an empirical observation, it is also true that when an organism makes a response which is "accompanied or followed by an annoying state of affairs," that response is likely to become less probable of occurrence. But the mechanism here involved is not, as Thorndike initially seemed to believe, simply the obverse of that posited in the first half of the Law of Effect. Thorndike's original formulation implied that just as "satisfying" results tend directly to strengthen the reactions that bring them about, "annoying" results tend equally directly to weaken them. Although the issue is still not fully decided, there is growing evidence, to which Thorndike (39) has again contributed, that habits are not directly weakened by "annoying" results, but are only indirectly affected through the development of incompatible habits. According to this view, which has been examined in greater detail elsewhere (31),

it is assumed that habits, once established, are never "taken out by the roots," but are eliminated (if the underlying motivation persists) only by being superseded by other contradictory adjustments. This newer point of view accords well with many facts and theories in the realm of personality and clinical psychology.

In summary, it may be said that, of Thorndike's two initial Laws of Learning, the first, the Law of Use, has been shown to be invalid, and the second, the Law of Effect, requires reinterpretation. The first half of the Law of Effect has become the basic formula for all learning; whereas the second half relates to the psychology of conflict, or habit dynamics, not to the basic process of learning proper.

Learning Through "Punishment" vs. Learning Through "Reward." In recent years there has been much discussion in educational circles (8, 9, 13, 41, 42) as to whether it is preferable to employ "positive" or "negative" motives in order to produce human learning. This statement of the problem tends to confuse the issue. According to the current conception, all motives are "negative" in the sense that they involve some form of tension or discomfort which the individual wants (strives) to eliminate. Only success is "positive," which consists of motivation-reduction. Thus, all learning presupposes "punishment" (motivation), and all learning also presupposes "reward" (motivation-reduction). Strictly speaking, it is therefore meaningless to say that one type of learning is "through reward" and another type is "through punishment"; each is an essential aspect of a single dynamic process.

But the problem has one very practical aspect. It now becomes clear that one individual can produce learning in another individual by either of three methods: (1) the "teacher" may create the "problem," *i.e.* make the "student" uncomfortable, and the student may solve it; (2) the student may have the problem, and the teacher may help him find the solution; or (3) the teacher may both create and help solve the student's problem. Although the same basic learning process will be involved in any case, the *social* consequences will be very different according to which of these three methods is employed. If method 1 is used, a negative (avoidant) attitude toward the teacher will develop; if method 2 is used, a positive (approach) attitude will develop; if method 3 is used, a mixed, or ambivalent, attitude will result.² The good "leader,"

² Cf. Holt's (20) discussion of "adience" and "abience."

like the good "teacher," naturally employs method 2 as extensively as possible.

ANTICIPATORY BEHAVIOR

A response, or action, is said to be consummatory if it is produced by a relatively strong stimulus (or stimulus-compound), called *motive*, and if the occurrence of this response reduces or eliminates the motive. This factor of motivation-reduction is called *reinforcement*³ and is assumed to be the active agent in all learning. Consummatory responses are thus self-reinforcing and self-perpetuating.

On the other hand, a response, or action, is said to be anticipatory if it occurs to a relatively weak stimulus (or stimulus-compound), called a *sign*, or *signal*, and if the response serves to prepare the responding organism for the impending situation of which the sign is premonitory. Anticipatory responses are, in general, adaptive in that they permit the organism either (a) to avoid or minimize the effect of the event signaled or (b) to take fuller advantage of it as an opportunity for reducing some already existing drive. Anticipatory responses of the first kind are appropriately said to be "defensive," whereas those of the latter kind are perhaps best described as "appetitive."

The experiments of Pavlov (33) and Bekhterev (4) and their many followers provide excellent laboratory illustrations of the conditions under which anticipatory, or so-called "conditioned," responses are likely to develop. To take a situation commonly employed by Culler (12) and his students, let it be supposed that a dog has learned to lift its right foreleg whenever a shock is applied to the grill upon which the foot of this leg normally rests. If, now, a buzzer is sounded shortly before the shock is presented, it will require but a few repetitions of this sequence of buzzer and shock for the animal to start lifting its foreleg in response to the buzzer alone. When this happens, the buzzer is said to have become a "signal" that the shock is about to occur; the response of lifting the leg, which would be called consummatory if it occurred to the shock, is now said to have become anticipatory, or "conditioned."⁴

³ Compare the Gestalt concept of "equilibrium" (43) and the Freudian "pleasure principle" (16).

⁴ Pavlov's "conditioned" and "unconditioned" responses are obvious parallels of Sherrington's "anticipatory" and "consummatory" responses, but are less meaningful because they provide no place for the factors of motivation and motivation-reduction.

TWO LEARNING SITUATIONS: ONE LEARNING PRINCIPLE

The factor of reinforcement can be unambiguously defined and demonstrated in the learning of consummatory responses: here it is patently the reduction in stimulation (motive) that is the critical factor. But in the case of sign-learning, the situation is at least superficially different: an anticipatory response may or may not reduce or eliminate the stimulus (sign) which elicits it, yet such responses can be, and are, learned. This fact naturally raises the question as to whether the mechanism of reinforcement is the same or different in sign-learning and consummatory learning.⁵

Investigators who have largely restricted their study of learning to the development of anticipatory responses have, in general, accepted the "association" theory of reinforcement, *i.e.* they have tended to assume that the active agent in learning of this kind is mere "temporal contiguity," or "paired presentation," of the sign (conditioned) stimulus and the signified (unconditioned) stimulus.⁶ It is true that temporal contiguity of the two forms of stimulation is a necessary condition for the occurrence of learning of this kind,⁷ but it appears not to be the sufficient condition. What has been rather generally overlooked by workers in this field is that in a conditioning situation one starts with a stimulus-response sequence (habit or reflex) which is consummatory. Thus, in the example given above, one starts with the dog's withdrawal response to shock, which is consummatory in that it terminates the shock. Each time this response is made, the resulting reinforcing state of affairs strengthens the relationship between the shock and the withdrawal response.

If, now, a second stimulus, *viz.*, the buzzer, is presented in such a way as to shortly precede the shock, it becomes a part of the total stimulus compound which "produces" the consummatory reaction of flexing the foreleg. Since the resulting state of reinforcement (shock-reduction) strengthens the functional relationship between the shock and the response, it follows that the functional relationship between the buzzer and the response will also be strengthened. When, after a sufficient number of what may be called "parasitic" reinforcements of the connection between the buzzer and the re-

⁵ For a defense of the position that they are basically different, see Schlosberg (34).

⁶ Special note should be made of the fact that Culler and his students have repeatedly emphasized the role of motivation in conditioning (7, 11, 15).

⁷ See Hull (22) for a more detailed analysis of the role of the time factor in learning; also May (27).

sponse, the buzzer will alone elicit leg withdrawal, this response becomes anticipatory, and conditioning, or sign-learning, is said to have occurred. Although the conditions of sign-learning are thus seen to be different from those of consummatory (or so-called trial-and-error) learning, the basic mechanism is the same in both cases.⁸

This hypothesis has three major advantages:

(1) It keeps learning intimately related to the factors of motivation and motivation-reduction, a prerequisite of any theory that is to square with common sense and clinical observation.

(2) It is consistent with the fact that consummatory learning appeared earlier in evolutionary history than did anticipatory learning, the latter developing only with the advent of "distance receptors" and the enlargement of the "association centers" in the nervous system (18, 36).

(3) It supplies a monistic conception of the learning process which more readily accommodates all the essential facts than does the association theory.

SOURCES OF MOTIVATION, PRIMARY AND SECONDARY

So long as the study of learning is restricted to those situations in which motives such as hunger and electric shock are mainly involved, the picture remains relatively clear and uncomplicated. But a realistic conception of the full range of human, or even animal, behavior must deal with other motives. Various designated as "emotions," "interests," etc., these secondary, or derived, motives can be conveniently divided into "affects" on the one hand and "appetites" on the other. Both appear to develop on the basis of conditioning, the former involving an anticipation of deprivation (anger) or of punishment (anxiety), the latter involving an anticipation of reward (*i.e.* some form of motivation-reduction). It is well known that learning can be motivated either by threats (affective emotions) or by promises (appetitive emotions). It also seems well established that a reduction in either an appetite or an affect is a reinforcing state of affairs and serves to fixate attendant behavior. The distinguishing feature of these secondary motives is that they are due to stimulation arising from responses made by the organism and may be set off by any of a wide range of signs (including words). The skillful user of signs can thus, on the basis of the derived drives, manipulate other individuals to his own

⁸ Hull (21) was one of the first writers to suggest the identity of the basic mechanism underlying these two superficially different types of learning.

ends; how long this procedure can continue is largely determined by how successful the sign-user is in making his signs continue actually to betoken the things and events which they are supposed to.⁹ The phenomenon of secondary motivation is intimately related to both civilian and military morale, which are discussed elsewhere in this symposium.

EXTINCTION

It is often as important to know how to eliminate habits as to establish them. It was formerly believed that habits and memories (symbolic habits) tend to disappear, with the mere passage of time, through a passive process of neural decay called "disuse" or "forgetting"; but it now appears that the process is a more dynamic one. Attention has already been called to the fact that habits can often be inhibited by introducing a new form of motivation which demands an incompatible type of adjustment. Much work has been done in the field of verbal memorizing which has led to the conclusion that so-called forgetting likewise involves a form of conflict, the "retroactive inhibition" of earlier memories by later ones (5, 28, 29). The psychoanalytic theory of lapses and repression involves a similar assumption (17).

The situation has been less clear as regards conditioned responses. It is well known that conditioned responses ordinarily disappear if they are not at least occasionally "parasitically" reinforced in the manner posited above. Thus, in the example given, the dog would eventually stop making anticipatory leg withdrawals to the sound of the buzzer; if such a "failure" of the conditioned response resulted in the animal again receiving a shock, the ensuing reaction would produce a "primary" reinforcement, from which the conditioned response would gain sufficient strength to revive for another period of trials. In this type of situation it might appear that the mere absence of reinforcement is alone sufficient to produce extinction, but as Mowrer, Miller, and Dollard (32) have pointed out, a conflict, which involves the factor of "fatigue" or "effort," is present even in this connection.

It has sometimes been noted that conditioned responses fail to extinguish as would normally be expected. When such cases are closely examined it is found that the persistence of the conditioned response is due to the fact that it is being reinforced by some source of motivation-reduction other than the one used to establish the

⁹ A logical, but unwarranted, extension of this discussion would lead to an analysis of money and the function of "token rewards" in general (45).

reaction. Thus, as Brogden (6) has shown, if a dog is fed every time it makes a conditioned response to a buzzer, which was initially learned as an anticipatory response to shock, the response may be kept active indefinitely (providing that the animal is hungry). This situation seems to be essentially what G. W. Allport (3) has termed "functional autonomy." It might better be designated as simply a shift in the source of reinforcement. This phenomenon seems to be relatively common at the human level and has not been given the attention that its importance would seem to warrant.

From this necessarily cursory discussion of extinction, the generalization emerges that learned responses (whether consummatory or anticipatory) are never eliminated in the sense that their neural correlates are erased, but only in the sense of being superseded by other antagonistic responses; "punishment" provides for the development of such conflicts, but so does the mere withdrawal of the accustomed source of reinforcement. Unless "rewarded" in one way or another, all habits eventually disappear.

GENERALIZATION, DISCRIMINATION, AND OTHER PROCESSES

Generalization, discrimination, and other more complex psychological processes have been shown by Pavlov and numerous later investigators to be open to profitable investigation at the level of the conditioned response; and Youtz (46) has reported experimental evidence for the assumption that the same mechanisms are also operative in the field of elementary consummatory behavior. Hilgard and Marquis (19) have covered these topics with especial thoroughness, and the reader is referred to this source for further discussion along these lines. Speech and other forms of behavior that are believed to be especially closely associated with "personality" have recently been approached from the learning and motivational standpoint (30).

The present paper makes no claim to offering a complete psychological system, but it is believed that the elementary principles that are here reviewed form a sound foundation for the analysis of the more special and complex type of problem that is likely to be encountered in practical life situations. The bibliography is also necessarily far from exhaustive, but will provide a point of departure for inquiry into more specialized aspects of the general topic of learning and motivation.

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PERCEPTION

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It is indeed trite to remark that the field of perception is extremely large and varied. Any psychologist who has done research on several perceptual problems in different areas will appreciate not only the extent of the field but the great varieties of special techniques and research competencies included under this single term. Hence, when we were asked by the Emergency Committee in Psychology of the National Research Council to form a Subcommittee for Perceptual Problems, we received their approval for the appointment of a group of specialists, each with special competency in some particular area of the field.¹ In order to survey the field and to determine what psychological knowledge already existed which had been applied to practical problems of a military nature, or what psychological constants existed which might be so applied, each member of the Committee prepared a selected, abstracted bibliography of the materials within his area. These collections of abstracts are deposited in the office of the Chairman in duplicate, so that one copy can be sent to any psychologist about to begin research of this nature in order that he may utilize these for orientation of his problem. The present article is a joint production of the Committee. Each member of the Committee has made a further selection from his selected bibliography, and this article is merely a presentation of these final selections collated and slightly edited as to form. The summaries of the most important items in the literature, which were prepared by the different members of the Committee, appear below.

¹ The membership of the Committee and the areas for which each has made himself responsible are: J. J. Gibson (organization of the visual field with special reference to camouflage); C. H. Graham (visual acuity with special reference to aviation); J. P. Guilford (psychophysical and statistical methods); H. Helson (color vision and visual acuity); R. B. MacLeod (seen movement and apparent visual movement); J. P. Nafe (cutaneous); S. S. Stevens (auditory localization); E. G. Wever (auditory acuity); M. J. Zigler (kinesthesia, taste, and smell); and S. W. Fernberger (Chairman). I should like to express my gratitude at this time to all of the members of the Committee for the very considerable amount of time which they have spent in the preparation of the materials for this summary and upon other matters connected with the work of the Committee.

COLOR PERCEPTION

The topic of color perception can be divided into any number of arbitrary subtopics, but the following eight divisions have been made more or less in accordance with the natural divisions of the subjects and their importance.

Color Specification. The specification of colors requires the use of standard stimuli and a standard observer, which have been defined in the recommendations made by the International Commission on Illumination and are given by Judd (155) and Hardy (120). Tables for the spectral energy distributions of the I.C.I. standard illuminants, A, B, and C, are given by Judd and Hardy as well as the values adopted for the standard observer. It is not necessary to use the standard illuminants to compute the trilinear coördinates for the color of any sample if the spectral energy distribution of the illuminant employed is known. Thus Davis and Gibson (55) have given spectral photometric data for two filters which, when combined with one of the standard illuminants, give the color of the equal-energy illuminant, and Gibson (102) describes a filter which can be used to give a monochromatic stimulus having dominant wave length at 560 m μ .

The specification of a color after the computation of trilinear coördinates enables one to plot its position in a triangular mixture diagram. Several such diagrams have been proposed, the two best known of which are the I.C.I. and uniform chromaticity scales (155, 156). The method of specification by means of dominant wave length and purity has been described by Judd (153, 155) and Hardy (120). The adequacy of specification in terms of a standard observer depends upon how nearly the properties of the standard observer are duplicated in the viewing situation in which the sample is seen. It is now known that the standard observer is duplicated only under very limited conditions (Helson, 124; Judd and Kelly, 158). Hamilton and Freeman (119) found the sensitivity of the average eye to each of three primaries to be different from the classical curves given by König, and Sloan (267) has found changes in the visibility curve as a function of intensity.

The most important attempt to specify colors in a quantitative way through a colorimetric approach has been made by Judd and Kelly (158), using classical colorimetric data supplemented by transformation equations for surface colors. The problem is further complicated when color names are employed due to the instability of color terminology as shown by Katzin and Murray (166) and the use of different systems of color nomenclature. This aspect of the

problem has been reviewed by Dimmick (60), who feels that an observer who is dealt with according to the technique of the psychological laboratory may be as reliable as the instruments used by the physicists. The newest method of designating colors which contains promise of widespread use is that by Judd and Kelly (157).

Dimensions and Modes of Appearance of Colors. So far the colorimetric specifications have been in terms of only three dimensions: hue, lightness, and saturation. Since the work of Katz (165) it is impossible to regard even so-called pure colors in terms of only these three attributes. The three classical attributes are fairly adequate for aperture (film) colors but not for the other modes of appearance which demand new distinctions and dimensions. Full accounts of modes of appearance are given in the now classical work of Katz, and the richness of a phenomenological approach is found also in Bühler (35). The chief modes of color appearance, according to Katz, are film, surface, transparent film and surface, voluminous, luster, mirrored, and glow colors. The new dimension of pronouncedness introduced by Katz may be the fundamental factor in the distinction made by Bocksch and Krauss (30) and Bocksch (31) and Krauss (181) between the gray series and the whiteness quality. That dimensions and modes other than the film can be made the subject of measurement has been shown by the work of Hunter on gloss (147, 148). On the other hand, the observations of Mintz (225) show that context in its influence on hue cannot be neglected even in the case of aperture colors.

Constancy and Contrast Effects. The use by Katz of differently illuminated spaces gave the greatest impetus to the study of so-called constancy effects as well as to a re-examination of classical views of contrast, adaptation, and other mechanisms at work in color vision. The classical work on contrast by Kirschmann (169), Hess and Pretori (132), and Köhler (179) was found inadequate to account for the many effects due to changed illuminations. The relations between contrast and constancy have been thoroughly discussed with attempts at finding parallel laws by Jaensch (150a) and his school, while Katz (165) and others, notably Katona (163, 164), have stressed their differences. The normal illumination postulated by Katz was shown by Gelb (96) to possess no primary significance, and in another publication (97) Gelb showed the importance of field illumination in the explanation of constancy effects. The importance of background in the determination of constancy effects was shown by Henneman (129) and by Helson

(124), so that it can now be ranked as equal with the illumination factor. The first quantitative determinations of the extent of constancy with admixture of white and chromatic illuminants was made by Helson (123), who has also proposed a unified theory of the interrelations of illuminant, background, and sample characteristics and constancy, contrast, and conversion effects (123, 124). The differences between selective and nonselective samples have been clarified by Helson and Jeffers (127). Laws of field size in contrast and transformation phenomena have been proposed by Haack (117). That the differential threshold for brightness is independent of transformation, as asserted by Katz, was confirmed by Koffka and Mintz (177). The role of shadows in constancy phenomena has been developed by MacLeod (203, 204).

Perception of Color and Chromatic Illumination. Since constancy tends to disappear as the illuminant is made more and more homogeneous, it was a natural step from the constancy investigations to proceed to the investigation of strongly chromatic illuminants. Katz had said that the illumination can be perceived, and subsequent studies have shown that threshold for this perception is higher than for differences within the field. Krüger (186) has found the limen for illumination perception to be higher than for surface colors, and Metzger (221) found that the limen for sudden changes in brightness is higher for the total visual field than for small areas within it.

The effects of changes in the intensity and quality of illumination are great and striking. With great reduction in intensity of illumination, surface colors tend to assume the characteristics of film colors, as pointed out by Marzynski (207) and Metzger (220). Weber (293) found color constancy even when the illumination was continuously changed within wide limits, but it is apparent that sufficient change in intensity brings about film colors. That different colors are seen when the quality of the illumination is changed has been brought out by Bocksch and Krauss (30), Helson and Jeffers (127), and Krauss (181). Attempts to match a color seen in chromatic illuminations by one in daylight failed, according to Bocksch and Krauss (30). In their various publications they stress the fact that colors in strongly chromatic illuminants can possess greater chroma and whiteness quality at the same time. This was verified by Helson (123). Another striking effect of chromatic illuminants consists in the phenomenal shortening of visual space (Krauss, 182).

Role and Importance of Adaptation Level. The quantitative ap-

proach to problems of constancy was made possible through the formulation of a theory of adaptation level by Judd (158) and Helson (123). Modification of classical theories of adaptation was found necessary by them (128) when strongly chromatic surfaces failed to yield the Hering neutral gray with prolonged observation. The formulation of the theory of conversion in terms of the relation of sample reflectance to adaptation reflectance has resulted in the unified theory of constancy, contrast, and conversion effects referred to above.

Intersensory and Organizational Effects. The problem of effects due to interaction both of items within the visual field and of one sense modality upon another, as well as of central neural systems, brings out the complexity inherent in even the simplest perception of color. Allen and Schwartz (11) show that red light, sound, quinine, and odors all depress the sensation of red, though they enhance green with a variable effect on violet. They also found other intersensory effects and believe that a central sensory area oscillates in sensitivity when the receptors of other sense organs are stimulated. Bartley (16, 17) has stated that the primary physiological conditions responsible for flicker fusion are beyond the retina and has suggested a rhythmic cortical activity for the Brücke effect. Binocular summation and subtraction of brightness, as found by DeSilva and Bartley (58) and by Shaad (258), seem to suggest the possibility of interaction within the central mechanisms. The work of Zietz (309), showing that sound can exert an influence on the course of the visual after-image and can even influence its color and contours, has frequently been cited as evidence of widespread cross-modal interaction. Evidence of this kind, however, is difficult to duplicate, and several studies, such as those of Pratt (243), have failed to demonstrate statistically reliable cross-modal effects. A recent review of literature in this field has been made by Ryan (253).

Interaction among the parts of the visual field has been the subject of a number of studies. Koffka and Mintz have found that figure and ground in vision result in modifications of Weber's law (172), and Graham (104) has studied factors for figure. Harrower (121) has also contributed to the question of figure-ground articulation. On the other hand, Fry and Robertson (89) do not believe that figure-ground mode of perception affects color except indirectly by motor adjustments of the eye which can be counteracted by the use of artificial pupils, fixation points, and mydriatics. Koffka and Harrower (175, 176) have demonstrated that the hard

colors, red and yellow, have greater organizing powers than the soft, green and blue, with important consequences for visibility and acuity. Koffka and Tudor-Hart (171) and Heider (122) have re-established the fact that the color of a part of a configuration is influenced by the context in which it appears. Werner (297) and Bartley (18) have both shown that contours of visual stimuli may influence visibility of the figure seen. The possibility that the tri-dimensional organization of the visual field may influence contrast has been asserted by Wolff (307) but denied by Rubin (252). Two other factors affecting the appearance of colors may be regarded as organizational effects: Sinemus (260) has found that in micropsia, no matter how produced, there is always an impression of increased illumination in which white gets better and black gets worse with changes in the hues corresponding to changes in intensity of illumination. The effect of distance on the perception of colors has been reported by Schmeckebier (255), who finds differences both in hue and in mode of appearance with changes in distance of observer and stimulus. The general theory of organization and color has been given by Gelb (96) and Koffka (171).

Subjective and Central Phenomena. Numerous phenomena classed as subjective but usually referable to definite causes are of importance in color perception. It is possible, as Erb and Dallenbach (68) and Abel (1) have shown, to see hues for which no stimuli outside of the eye are responsible. Prominent among the after-effects of stimulation is the flight of colors reported by Berry (24) and Berry and Imus (25). The latter have made a quantitative study of the combined effect of the intensity and duration of the stimulus upon the duration and number of phases in the after-image cycles. After-images from spectral colors have also been investigated by Karwoski (160, 161).

Important for visual functioning when small objects are seen in the dark or on homogeneous backgrounds is the Charpentier effect or the autokinetic phenomenon, which has been extensively studied. Guilford and Dallenbach (110) made records of the eyes during the apparent movement of a dim spot of light in a dark field and found that no gross eye-movements were present. These workers and Guilford (111) later report typical paths of movement. Bjorkman and Gothlin (29a) support a muscle strain theory of the phenomenon. While the phenomenon of flicker has been extensively studied, for example, by Bartley (16, 17), Haach (116) has shown that there are numerous brightness and color phenomena accompanying the ordinary flicker experience. In the use of op-

tical instruments, the factor of retinal pressure images may come into play. Kampmeier (159) has reported on the designs and sequences of these images.

No consideration of color perception can fail to find individual differences both among normal and color-blind individuals. Pierce (242) has given an excellent survey of individual differences in normal color vision, and Garth (91) has reported percentages of color-blindness cases among several races. The failure of Colson (46) to find any effect of alcohol upon vision in the case of 21 normal subjects needs further confirmation.

Affective Value of Colors. The emotional effects of colors have long been a subject of common sense and scientific consideration, yet it is one of the most difficult aspects of color vision due to the many factors which enter into hedonic states. The most systematic attack on the problem has been made by Guilford (112, 113), who has tried to formulate the relationships between hue, tint, and saturation and color preferences. As a result of Guilford's work certain lawful regularities are beginning to appear. Tinker (282) has investigated stimulus texture and its effect upon apparent warmth and affective value. He found little effect of surface texture upon either warmth or affective value. His study also reveals sex differences in color preferences.

ACUITY AND SPACE PERCEPTION

Visual perception, in so far as it is not a matter of color vision, concerns the apprehension of the spatial characteristics of stimuli. Several aspects of this problem are treated below.

Sensitivity and Acuity of the Eye. It is a well-known fact that, under conditions of medium or high illumination, the fovea is the region most sensitive to light but, when the illumination is reduced to twilight proportions, the periphery of the eye becomes the most sensitive region and takes over visual function. The relation between sensitivity and retinal pigmentation was studied by Helson and Guilford (126), who found that dark-eyed subjects were superior on the average to light-eyed both in the fovea and in extrafoveal regions. The relation of sensitivity and acuity still needs experimental clarification.

The measurement of visual acuity and the conditions affecting it have been the subject of many studies. Gabriele (90) has proposed the unit of surface in place of the visual angle as the true criterion in measuring visual acuity. Ferree and Rand (76) criticize the capital letter charts commonly used and recommend the use of

broken circles to test visual acuity, hoping by this means to eliminate the recognition factor present in the charts. Freiman (88) points out that there is a correlation between superior visual acuity and superior depth perception, but the former does not guarantee the latter.

Among the factors important for visual acuity are age, intensity of illumination, wave length of the light stimulus, and so on. Ferree, Rand, and Lewis (77) present data showing that the normal young eye requires about 10 foot-candles for excellent acuity, while presbyopic observers show gains in acuity with as much as 100 foot-candles. In another publication, Ferree and Rand (73) add, among their requirements for good acuity, freedom from glare and placement of light source. They also stress the quality of colored light, regarding yellow as the least harmful. Along the latter line Roaf (249) showed that visual acuity is less with light of short wave length than with light of medium and long wave length. Differences within the eye are proposed for these findings. Tinker (281) has investigated the accuracy of visual apprehension as a function of letter position, finding irregular decreases for each successive position through the seventh. When letters were exposed on cards of different hue, the apprehension score was higher than for a single stimulus card of uniform color. Luminosity contrast between figure and ground is said by Tinker to be the all-important determinant of visual apprehension of material. Finally, the relation of acuity and distance has again been simplified by Musylev (229), who reaffirms the old doctrine that visual acuity is determined chiefly by the angle at which the object is observed.

Perception of Form. While the perception of form is in many respects a problem belonging to the field of visual acuity due to the complicated retinal conditions affecting it, it has been studied quite apart. Helson and Fehrer (125) showed that form as such does not affect sensitivity thresholds when different forms having the same area are used as stimuli. They also found that pointed figures, like triangle and rectangle, were most easily and correctly reported at threshold rather than the circle. Collier (45) found similar results for indirect vision when he showed that the perceptual field was greatest for triangle, square, and parallelogram, with highest certainty for triangle and least for circle. Collier also found the horizontal quadrants to be superior to the vertical. The peripheral sensitivity for form was also studied by Whitmer (303), who also found the triangle to be the best figure over practically the whole extent of the field. The horizontal meridian was

again found the best for accurate discrimination of all forms. Ferree and Rand (72) found that the relations in brightness between figure and ground importantly affect the size and shape of the form field.

Apparent Size and Distance Perception. The historical controversy over the relative importance of accommodation and convergence in the judgment of distance is renewed in a study by Swenson (273), who concludes that convergence is about three times as effective as accommodation in the judgment of distance. Related to this problem is the study of Kestenbaum and Eidelberg (168), in which they found that to every act of convergence there is a definite mean pupillary diameter. They state that accommodation and convergence are not true reflexes because only interesting objects evoke them.

Binocular Visual Functioning as It Concerns the Foregoing and the Special Problems Arising From the More Complicated Conditions of Binocular Function. The mechanisms and phenomena of binocular visual functioning embrace a host of problems. In three publications, Betts (26, 27, and with Ayers, 28) discusses his materials for detecting impaired binocular fusion and presents data on their reliability and validity. Dobson (61) has published a small book on a new branch of therapeutics known as orthoptic training for the cure of squint and other defects due to muscular imbalance. The various methods of diagnosis and cure are discussed. Another monograph on the problem of binocular fusion has been published by Morse-Peckham (226), who has striven to present the subject in nontechnical language. Creed (49) points out that form and color may be dissociated when two patterns of similar design but different color are seen simultaneously in a stereoscope. The design of one is seen, but its color is modified. Lineback (195) suggests that in the dominant eye the distance of the fovea to the optic nerve is much less than in the other eye. If true, this would furnish an anatomical basis for eyedness and an objective means of determining it. The perception of mass or relief is said by Mendoza (218) to be capable of mediation by the single eye, space or distance perception being mediated by binocular parallax.

VISION, ESPECIALLY AS RELATED TO MILITARY PROBLEMS

A survey of the literature² indicates that visual performance is

² In organizing this part of the bibliography at least 300 references were examined. Of these, only about 100 turned out to be immediately relevant to the

particularly emphasized in aviation. In the present bibliography orienting papers in this field concern standards of performance (8, 22), some discussions of ophthalmological selection (15, 280), and a few considerations of broader psychological principles (62, 100, 259). The topic of range finding (105) is represented by two references dealing with psychological factors in performance (80, 184). Color vision receives only one citation (217), a reference specifying requirements for the Royal Navy.

Space Perception. This problem receives considerable attention. Since the development of the Howard-Dolman test (144) a number of clinical investigations have been performed for the development of norms (e.g. 59, 214). The earlier study cited (59) indicates a small difference in space perception thresholds in favor of qualified, as opposed to disqualified, aviators. However, the results are not conclusive, since in 21 cases disqualification was based on other ocular defects. A theoretical discussion of depth perception in aviation is given by Gemelli (101), and depth perception tests are considered in other references (44, 88, 196, 197, 202). Livingston (201) raises the question of the adequacy of monocular vision in pilots.

Measurements of Visual Accessory Mechanisms. Functional measures of the visual accessory mechanisms are widely accepted as selective tests, particularly in aviation. Ferree and Rand (75) describe an apparatus for testing "general fitness" where "dynamic speed of vision" is important, and Robertson (250) describes measurements of the adjustment of the eye to near and far vision. Tefft and Stark, in an early paper (276), conclude, on the basis of observations, that measurements of speed of accommodation are not necessary in qualifying tests for aviators. Livingston (199, 200) emphasizes disturbances in flying caused by heterophoria. Clements (43), on the basis of a number of measures of ocular function, finds that "good" aviators have more efficient vision than "accident-prone" aviators. Berens and Stack (23) tested speed of accommodation by an ergographic method. They find that disqualified aviators tend to show slightly greater changes in accommodation under reduced oxygen tension than do qualified aviators. In the work on space perception and functional measures, little attention has as yet been paid to aniseikonia (12, 239).

problem of vision in relation to military performance. Selections were made from relevant articles, and it is assumed that the bibliography gives a fair representation of the status of the field. C. H. G.

Undoubtedly, the facts ascertained in this field will have military applications.

Night Blindness, Dark Adaptation, Light Adaptation, and Visibility. The importance of night blindness is recognized in some recent experiments. Beyne and Worms (29), Comberg (47), and Metcalfe (219) discuss methods for testing night blindness and acuity in dark adaptation. Korb (180) finds that "perception time" to light stimulation is decreased in naval aviators exhibiting night blindness when vitamin A is given daily. A paper by Ferree and Rand (74) falls in the category of work dealing with light and dark adaptation. The authors discuss a method for measuring acuity at low illuminations. The work of the German Signal Corps comes in for some recognition by Hüttner (149), who has performed an experiment on the visibility of miniature semaphores.

Effect of Oxygen Deprivation. In a recent series of experiments, McFarland and his collaborators have studied the effects of oxygen deprivation on visual performance (cf. also the earlier work of Wilmer and Berens, 305). The results are particularly significant on the problem of flying at high altitudes. The investigators find that under oxygen deprivation the angioscotoma area widens (212), dark-adaptation thresholds increase (213), visual acuity is decreased at constant intensity (215), and eye-movements in reading show a high degree of disorganization (216).

Environmental Influences. In a clinical study Livingston made exhaustive analyses on the effects of sun glare in Iraq (198). He finds that constant exposure to sun glare results in definite clinical changes which are significantly detrimental to aviation and other occupations. Snow blindness, as a military problem, might merit similar investigation.

Reliability and Validity. The literature as reviewed shows little effective impress of the psychological concepts of reliability and validity. An exception to this is found in the work of Warren (292), who correlated findings on two tests of space perception to find a correlation of 0.12. The general rule-of-thumb procedure evidenced in much of the research seems to be that of (a) accepting a test as having *a priori* validity or (b) attempting to correlate findings with inclusion in one of two classes, e.g. "qualified" and "disqualified." Improvement in procedure would seem to require the development of quantitative specifications of particular military "capacities" (e.g. success in flying) in order that individual tests or batteries may be properly validated. At present we have no way of knowing whether many of the visual tests now used relate

to military performance in any serious way. At worst they may be only guarantees of the "visual health" of the trainee.

VISUAL ORGANIZATION, PARTICULARLY AS RELATED TO CAMOUFLAGE

The military problem of camouflage, which both in the last war and in the present one has so completely captured the imagination of the public, is far from being formulated in scientific terms. In actual fact it is not one problem, but many. The concealment of objects from enemy observation—making them indistinguishable from their background—is one type of problem, while the *disguising* of objects—making them unrecognizable for what they are—is quite a different problem. Both concealment and deception, moreover, present different problems in the case of *aerial observation* (and photography, especially infrared photography) on the one hand and *ground observation* on the other. Field and coast artillery emplacements, depots, hangars, roads, harbor facilities, industrial plants, storage tanks, warehouses, and the like all constitute special problems in themselves. Furthermore, each single potential target is different from every other and requires a different treatment, depending on the nature of its environment (e.g. city or countryside) and its own peculiarities. Some idea of the complexities involved can be indicated by pointing out that the effectiveness of camouflage will vary with the season of the year (background of snow or foliage), and with the conditions of illumination (night, day, and time of day).

The attempt to give a deceptive appearance to vessels at sea in the last war was another distinct problem having little in common with land camouflage, although the popular conception of camouflage is almost wholly derived from this attempt. It was termed "dazzle-painting." The mottled patterns and colors employed were not intended to destroy the visibility of the vessel, as is commonly assumed, but only by distorting its perspective to make difficulties for the submarine commander who had to calculate its angle to the line of vision through his range-finder. Whether such piebald coloration of an object *seen against a homogeneous background* has the slightest effect in concealing it is at least questionable; the assumption that it "breaks up the contour" has apparently never received any empirical verification. The various systems of dazzle-painting were, in the beginning at least, based on the *a priori* recommendations of artists (13, 291, 304).

Camouflage has been carried out chiefly by military engineers,

and whatever theoretical principles have been employed have been contributed either by artists or by biologists interested in the protective coloration of animals. The literature of the subject is scattered, controversial, and notable for amateur theorizing. No psychologist as yet has done any serious work on the subject, and only Metzger has discussed it (223). Nevertheless, the basic theoretical principles governing the seeing or not seeing of a recognizable shape in its spatial framework or background are psychological principles. The problems involved include those of figural organization, color differentiation, and the perception of relief, particularly as dependent upon shadows.

Relevant Psychological Principles. Wertheimer, in 1923 (299), for the first time formulated a set of laws for the formation of units of shapes in the phenomenal visual field. A science of camouflage, as distinguishable from the practical art, would have to take its departure from principles of this sort. Gottschaldt (103) has described methods for rendering invisible one visual pattern by imbedding it in another more inclusive one. Koffka (174, Chaps. 4, 5) has discussed at length figural organization and the perception of figure on ground, and Metzger (223) has applied such principles to camouflage and to protective coloration among animals, illustrating in particular, similarity, togetherness, common fate, good continuation, disruptive patterning, and the principle of interstitial shape (*Zwischenraum*) in relation to camouflage.

Protective Marking and Coloration. The classical book on protective coloration in animals from which much of the speculation about camouflage has been derived is that of Thayer and Thayer (278). A. H. Thayer, who was an artist as well as a naturalist, has applied his theories to military camouflage (277). Their relevance to the modern problem of protection from aerial observation is doubtful.

Practical Military Camouflage. The literature dating from 1917-1918 is largely specific to the problems of trench warfare (2, 285). Solomon (269), however, discussed the interpretation of aerial photographs, and very recently a book has been published by Chesney (41) on contemporary problems of military, including aerial, camouflage. The theoretical confusion which reigns in this field, among English scientists and presumably among the authorities in England also, is reflected in a controversy in the pages of *Nature* which began with an article published in June, 1940 (14). In this country little work has been done on the problem, although

some research is apparently being carried out at the Army Engineer School at Fort Belvoir, Virginia, and at the Kansas City Art Institute.

SEEN MOVEMENT AND APPARENT VISUAL MOVEMENT

The best secondary sources on the perception of movement are as follows: (a) Up to *circa* 1924—Hofmann (133). Discussion is organized topically. The special researches are not summarized in detail, but the major findings are all reported and critically evaluated. There is a nearly complete bibliography. (b) Koffka (173) reports the literature up to about 1930. The viewpoint is that of Gestalt theory, but experimental findings are carefully reported, and the bibliography is well selected. (c) The literature up to 1932 is summarized by Neff (232). The bibliography is incomplete but well selected, and there is a useful topical summary of the experimental findings of the leading investigators. Summaries of this topic have appeared in the *Psychological Bulletin*: up to 1928 by Squires (270); 1928–1930 by Ewert (70); and 1930–1935 by Hovland (143). There have been no published summaries since 1935. In the following abstracts special attention has consequently been devoted to publications of the past five years, although a few earlier articles of particular pertinence have been included.

There has been almost no direct application of the psychology of movement to military problems. Schubert (257) and Gemelli (99) discuss some problems connected with the maneuvering of airplanes, but report little that is new. The Phi test of lateral dominance, described by Jasper and Raney (152), might have practical value, but it is only one of several good tests. Useful information must consequently come from general reports of experimentation. The experimental problems which seem most worthy of consideration are indicated below.

Perception of Real Movement. Essential conditions for the perception of real movement are described by Fallert (71) and Crook (50), and a special investigation of peripheral perception of movement is reported by Vernon (286). The after-effects of seen movement are reported for spiral movement by Gates (92), and further discussion of movement after-images will be found by Hofmann (133) and Koffka and Sturm (178).

Conditions of Apparent (Stroboscopic, Phi) Movement. The most precise determinations of the conditions for apparent visual movement in the recent literature will be found in DeSilva (56, 57),

Neuhaus (234), and Mibai (224) while the earlier work is fully reported and critically evaluated by Hofmann (133) and Koffka (173).

Perception of Various Aspects of Seen Movement. The basic observations for the perception of velocity are reported by Brown (34). The subsequent articles on this topic are concerned principally with some of the theoretical issues. The outstanding article for pursuit of movement is by Maschke (208). The basic determinants for the perception of the direction of movement are thoroughly discussed by Wallach (287) and by Redslob (244). Some interesting observations regarding the perception of the direction of movement will be found in the English abstracts of Japanese articles by Ogasawara (236) and Ogawa (237, 238). A full description of the phenomena and a discussion of conditions of autokinetic phenomena will be found in the earlier literature, while the most recent statement regarding this topic is by Skolnick (261). The classical presentation of the problem of induced movement is by Duncker (63), while further developments are reported by Krolik (185), Oppenheimer (240), and Metzger (222). An interesting study by Dauser (54) on induced movement when the head or body is the frame of reference may be important, but is not available to the reviewer.

AUDITORY PERCEPTION

General references concerned with the sensitivity of the ear will be found in Fletcher (79), Lewis (191), and Stevens and Davis (271). Reports by Békésy (21), Brecher (33), and Wever and Bray (301) indicate that the range of hearing in the normal, young adult is about 15~ to 20,000~. Some individuals, especially among boys and women, can hear sounds above 20,000~, perhaps up to 23,000~. The observed limits depend upon intensity. It has been found that the upper limit of pitch perception varies with age. Beasley (19), Bunch (36), and Bunch and Raiford (39) present results which show a progressive decline, on the average. That curtailment of the upper limit and grave loss of acuity in the upper portion of the range are much more common in men than in women is indicated by Beasley (19) and Crowe, Guild, and Polvigt (51). The findings of Ciocco (42) and Fowler (85) indicate a localized loss of acuity in the region of 4096~ which is particularly common in men but rare in women. Fletcher (79) and Wegel (294) agree that the region of greatest acuity extends from 800 to 4000~, and Hughes (145) shows that auditory acuity is greater for two ears

than for one. It is emphasized by Bunch (37, 38) and Guild (106) that special equipment and procedures are necessary for the clinical testing of hearing. The problems of the discrimination of pitch and loudness have been extensively reviewed by Fletcher (79), Lewis (191), and Stevens and Davis (271). In general the results indicate that the discriminations for both variables vary greatly among individuals and that they are subject to much improvement through practice.

Perception of Complex Sounds. The fact that tonal stimuli of high intensity produce overtones through distortion in the ear is reported by Békésy (20), Fletcher (79), and Janovsky (151). When two or more tones are applied simultaneously to the ear, several phenomena of a complex nature result. The conditions for the production of beats are reported by Wever (300); of combination tones, by Kuhl (187) and Lewis and Larson (192); of masking, by Wegel and Lane (295); and of interference, by Wever, Bray, and Lawrence (302). The reports of Eschweiler (69), Lewis and Lichte (193), and Trendelenburg (283) indicate that the analysis of complex sounds is one of the basic properties of the auditory system, but one as yet incompletely understood.

AUDITORY LOCALIZATION

The general topic of auditory localization has been adequately covered by Stevens and Davis (271) up to the year 1938 in regard to both fact and theory. Therefore, the following references include only some of the important findings since that date. Employing tones of considerable range with small intensities, Zakrzewski (308) reports that a very small increase in intensity improves the accuracy of localization and that localization is best in the horizontal plane, less in the frontal plane, and worst in the sagittal plane. He also found that interrupted tones are better localized than constant tones, and this seems to confirm the assumption that the valuation of direction occurs at the beginning and end and not during the continuation of the tone. This latter finding is also confirmed in the results of Wilska (306), who finds that the localization of crackling sounds is the most perfect, but that continuous noises and mixed sounds also rank high. Sounds such as these would comply with the conditions of frequent discontinuance and recommencement.

There is still considerable disagreement regarding the relative importance of phase, time of arrival of the sound at each ear, and differences in intensity as the basis for binaural localization.

Hughes (146), employing least perceptible changes of phase at various frequencies of pure tones, attempted to find whether there existed any upper frequency limit for the detection of such changes. He found that phase (time) differences alone, with no intensity difference at the two ears, can serve as the basis for localization. For nearly all observers, the detection of changes of phase becomes difficult at about 1300~ and impossible at about 1500~. Isii (150) opposes the temporal hypothesis. Employing such complex sounds as a flute and the human voice transmitted through rubber tubes of varying length, each connected with one ear of hard-of-hearing subjects, gave localization with the sound source constantly in the center of the apparatus. Knöpfel (170) argues that the direction judgment depends on the difference of both time and intensity of the impact of the sound waves in the two ears and the fusion of impressions from both ears. He finds that when the change of the physical factors is sufficiently slow, no change in localization occurs. Güttich (115), employing a new technique, concludes that exact localization of sound requires the unobstructed cooperative functioning of cochlea and vestibule, and Wilska (306) concludes that when the observer moves his head, the cochleo-vestibular quotient determines the choice between the directions of the time-difference equivalents.

Wallach (288) states that spatial localization of auditory stimuli, due to the differences in time between the reception of the stimuli by the two ears, accounts for localization in the median plane only. For localization in the other two planes he sets up an hypothesis that emphasizes changes between the ear-axis and the side angle in orienting the head to the source of sound. In order to test this hypothesis, Wallach (289) arranged 20 loud-speakers in an arc around the observer, whose head was attached to a switch in which a contact slid over a series of points during the turning of the head. He was thus able to achieve an experience of a certain sound direction by presenting during a head movement the proper sequence of lateral angles. In a third paper, Wallach (290) indicates the importance of either vestibular or visual cues in sound localization and shows experimentally that either can replace actual head movements. Thomas (279) presented sound and lights simultaneously in different spatial positions, and his results showed a tendency for the subjects to skew the sound's localization toward either a flickering light or an in-rhythm light.

Tuzuki (284) used a sound stimulus which moved in the form of a circle, triangle, and square with different starting points, in an

effort to study the pathway of a moving sound. He found that the pathway of a sound movement could be perceived, that some relationship was found between the perception of visual and auditory movement, and that the special importance of the starting place must be emphasized. Knöpfel (170) reports personality differences related to sound localization. Extraverts appreciate direction more clearly, quickly, and plastically than introverts. Nevertheless, the latter can attain, through practice, almost as great certainty as extraverts, although the experience itself remains essentially different in the two types. Rosenburg and Slavinsky (251), by mounting two microphones in the head of a lifelike dummy in the position of the two eardrums, were able by means of amplifier output to measure the effectiveness of sounds ranging from 300 to 2200~ in the three principal planes of space. They found that the curves expressing the results for the horizontal plane agree, for the most part, with those of previous investigators, but derive new curves for the other two planes. Such purely physical curves of intensity for the two ears should prove of interest for comparison with psychological findings.

No references on the extremely important topic of sound tolerance are included in the present report because the field has been very inadequately investigated. At the present time we have practically no knowledge of how much sound the human ear can stand.

KINESTHESIS

Psychophysical. The trend in psychophysics is toward the measurement of kinesthetic sensitivity over wide ranges of internal and external variables. The relative differential threshold as a function of intensity declines rapidly at first, then more slowly, as indicated by the results of Holway and Hurvich (137) and Schriever (256). Borak (32) shows that sensitivity is greater for a given stimulus increment than for decrement. That bimanual sensitivity is greater than unimanual was demonstrated by Holway, Smith, and Zigler (139). The same authors (140) have shown that differential sensitivity as a function of the rate of lifting increases, passes through a maximum, and then decreases. Holway, Golding, and Zigler (135) show that the recovery time following pre-exposure to different stimulus amounts is a direct function of the amount of exposure; while Holway and Zigler (142) find that it is also a function of the duration of exposure for a constant pre-exposure stimulation. Postcontraction, whose kinesthetic component has long been recognized, has been measured as a function of

intensity by Allen and O'Donoghue (10) and Holway, Crolus, Pratt, and Zigler (134). Allen (9) reports this function is found to exhibit a cyclic behavior when varying rest periods are used.

Neurophysiological. These data comprise mostly electrical records of nerve and muscle events during stimulation of receptors. That frequency of nerve discharge varies directly with the amount of tension impressed on a sensory field has been demonstrated by Adrian (3) and Adrian and Zotterman (6). Adrian and Umrath (5) and Matthews (208) both indicate that steady pressure yields a mode of discharge that declines rapidly at first and then more gradually. That adaptation begins immediately has been shown by Adrian and Zotterman (7). Forbes and Cattell (84) find that, in reflex activity, muscle fibers may respond in alternation, and Forbes, Campbell, and Williams (83) and McCouch, Forbes, and Rice (211) indicate that the afferent impulses arising in a muscle issue in four distinct groups. That the impulse discharge from a preparation containing a single muscle-spindle exhibits a "pause" during the shortening phase and a discharge during the relaxation phase of contraction has been shown by Matthews (210). The results of Forbes, Baird, and Hopkins (82) indicate that the same rhythm occurs in electrical records secured during voluntary contraction and during the involuntary postcontraction. The best general survey of kinesthesia is by Skramlik (266).

Cutaneous. It is said that the reaction time for light touch is the shortest of all the departments of sense, but the evidence is weak. Martin (206) reports that tactual "acuity" for form varies with different parts of the body. Zigler and Northrup (313) have shown that, compared with visual acuity, tactual acuity is very poor, and Zigler (310) has shown further that it has relatively narrow limits. Renshaw (246) and Franz and Eilduff (86) give results which indicate that tactual acuity is learned. The ability of the blind to detect the presence of objects, *e.g.* walls, is in part based upon tactual sensitivity, as has been shown by Lamarque (189). Fraser (87) reports that under some conditions the blind show greater tactual acuity than the normal, not because they are more sensitive but because they are more practiced. Gatti and Dodge (93) report that tactual perception is better with increased intensity of stimulation but that this follows no known law. That cutaneous perception of form, like visual perception, is subject to illusion has been demonstrated by Révész (247). Cf., for example, Craig's (48) demonstration that empty space is perceived as greater in extent than filled space.

That the conditions for tactual and visual perception of movement are essentially similar has been shown by Neuhaus (235), and Schaefer (254) hence can show that they are subject to similar illusions. Geldard (98) has demonstrated that vibratory sensitivity is essentially tactual perception of movement, and Gault (94) and Gault and Crane (95) report that, within limits, vibratory sensitivity may substitute for hearing. There are at least two conditions for pain: (a) injury to tissues and (b) extreme vascular constriction from either heat or cold (Nafe and Wagoner, 231). Wells and Hoisington (296) make the distinction that pain aroused by injury does not adapt in the ordinary sense; while Stone and Dallenbach (272) show that pain from heat, when no injury to tissue is involved, does adapt. Zigler, Moore, and Wilson (312) give results which indicate that cutaneous pain is better localized than pressure.

Feelings of warmth and cold are closely related to vascular action. Hence a rising temperature may be more comfortable than a higher temperature that is falling, according to Nafe and Wagoner (230). Kuntz and Haselwood (188) show that forced dilation of blood vessels of the skin, *e.g.* by vacuum cup, gives the same reflex effects as warming—a fact that relates both to bodily comfort and to the treatment of some internal conditions, particularly in the gastrointestinal tract.

Gustation. The Weber fraction for taste declines rapidly at first, then more slowly, passes through a minimum, and tends to rise (Holway and Hurvich, 136). The same authors (138) report that speed of reaction to saline solution is an increasing function both of the applied pressure and of the area of the stimulated sensory surface at constant temperature. Fodor and Happisch (81) give results which indicate that a given increment from a comparison stimulus is better perceived than a decrement of the same magnitude. Adaptation for three primary qualities is rapid at first, then progressively slower, but for sweet the rate is slower at first and more rapid later. All four recovery curves decline rapidly at first and then more slowly (Hahn, 118). Skramlik (262, 263) reports the determination of mixture equations for the tastes of inorganic salts, but Hennies (130) has shown that these do not hold immediately after adaptation and Werner (298), after progressive dilution. Such mixture equations have also been made for certain organic salts by Hertel (131).

There is little quantitative research in this field, but some speculation concerning the nature of the receptor process. One physico-chemical theory, advanced by Lasareff (190), states that there are

four kinds of papillae whose ionized products excite the nerves. Renqvist (245) has assumed the existence of an absorption process occurring between the solute and the taste cell. A direct relation is found to exist between concentration of solute and cell permeability by Crozier (52) and Taylor (274, 275). The best general summary for taste is by Crozier (53).

Olfaction. Dirhinic sensitivity is found to be greater than monorhinic by means of largely different methods used by Elsberg (66, 67) and Holway, Stuart, Winchell, and Zigler (141). Zigler and Holway (311) have shown that the differential sensitivity-intensity function is essentially hyperbolic in form. The capacity to localize odors has been demonstrated by Skramlik (264) not to depend on odor but upon associated thermal, pressure, pain, and taste qualities. Adrian and Ludwig (4) report that electrical activity in the first cranial nerve shows that the olfactory organs respond to mechanical and to chemical stimulation. Fluids containing solid matter in suspension are most effective. An excellent general survey of the field of olfaction by Skramlik (265) is available.

QUANTITATIVE METHODS IN PROBLEMS OF PERCEPTION

In the quantitative study of perceptual problems, one is commonly faced with two phases. The first is a matter of making the measurements, and the second is a matter of treating the results statistically. The one naturally depends upon the other. Of particular interest to the person dealing with practical problems in which certain aspects of perception are crucial will be some of the recent developments either in measurement methods or in statistics, particularly procedures which open up new possible avenues of measurement or which offer new economies in time and effort.

Traditional psychophysical methods received a systematic exposition by Guilford (107) in 1936. In this source are mentioned the various time-saving devices that had been introduced up to that time. There has been little improvement in or extension of the psychophysical methods since that date. Some innovations in scaling methods, which may also serve as psychophysical methods, however, have recently appeared. Two important examples may be cited. One is Mosier's (227) economical procedure for calculating scale values from judgments in successive categories; the other is Guilford's (108) procedure for scaling stimuli merely from first (and/or last) choices. Mosier's method is applicable to rate-scaling data and to data generally which represent quasi-absolute judg-

ments. The construction of tests of perceptual powers requires the customary statistical evaluations that are applied to most mental tests. The procedures of item analysis therefore enter the picture. Most notable of the new economical ways of determining item validity are those suggested by Flanagan (78), Mosier and McQuitty (228), and Guilford (109). All these provide abacs for the quick graphical determination of validity by correlation. Flanagan's method finds Pearson's r , Mosier and McQuitty's estimates tetrachoric r 's, and Guilford's gives phi coefficients. Mosier and McQuitty also provides an abac for critical ratios and Guilford an abac for chi square.

New developments in statistical methods in general are well summarized to the year 1938 by Dunlap (64), who cites 99 references. Notable in recent trends have been the active exploitation of factor-analysis methods and the new, but growing, applications of analysis of variance to psychological problems. Although it is too early to say whether or not the variance methods will add much to the psychologist's armamentarium beyond what is provided by traditional tests of significance and correlation procedures, it can be said that a reading of such books as those of Snedecor (268) and Lindquist (194) will convince one of their versatility and promise. Peters and Van Voorhis, in their general mathematical treatment of statistics (241), however, discount this promise (p. 353) and suggest the use of Kelley's ϵ -coefficient to perform some of the functions of variance analysis. As a ready aid for quick estimates of statistical constants of many kinds, the Dunlap and Kurtz Handbook (65) serves admirably. It also contains many statistical tables and virtually all the formulas in use up to the date of its publication. Kelley's new tables (167) provide greater scope and accuracy, when values connected with the normal probability curve are wanted, than had been attainable before. Many other practical devices, too numerous to mention here, may be found, particularly in the recent volumes of *Psychometrika* and also the *Journal of Educational Psychology*.

CONCLUDING STATEMENT

There are at least three reasons for the preparation of the present paper, any one of which would have justified the time and labor spent on its preparation.

(1) It is hoped that we have here presented a picture of the present state of research in the perceptual field. It will be ob-

served that there has been an emphasis upon visual problems which far outweighs the past accomplishment in any of the other perceptual areas.

(2) It is hoped that the reader may develop some idea of the applications of perceptual data and principles which have been made to problems of a military nature. Much variation is found in this respect for the different perceptual areas.

(3) It is hoped that this paper may present some of the important existing perceptual constants which have been determined experimentally and which may form the basis for future application to practical problems.

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LITERATURE ON PROPAGANDA TECHNIQUE AND PUBLIC OPINION¹

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Four main streams of propaganda activity in recent decades have contributed to the growth of a body of data and concepts which today may be termed "the general theory of propaganda." Some grasp of each of these streams is probably necessary to the effective maker of propaganda, whether in peace or war. They are:

- (1) propagandas of nationalistic war;
- (2) commercial propagandas (advertising, publicity, and public relations);
- (3) propagandas of humanitarianism;
- (4) propagandas of revolution and counterrevolution.

Primary emphasis in this bibliography will be upon the propaganda of nationalistic war. Nevertheless, it should be borne in mind that these three other streams of propaganda will be directed simultaneously at the public, unless suppressed. Due allowance needs to be made for this fact. It is also obvious that a great deal may be learned about war propaganda by observing the techniques of other types of appeal. For these two reasons, a brief discussion of the rival propagandas is included at the close of this paper.

PROPAGANDAS OF NATIONALISTIC WAR

Publications on this large topic may be divided into two groups: (1) broad general treatises; (2) works on morale at home—an especially significant problem for Americans.

(1) *Broad general treatises* on war propaganda include a score or more of useful volumes, among which we may give special attention to four exceptional books by Lasswell (21), Paxson (40), Bruntz (5), and H. C. Peterson (41). Lasswell, American political

¹ For complete lists of works on propaganda and public opinion, consult the comprehensive annotated bibliography, *Propaganda and promotional activities* (26), compiled by Lasswell, Casey, and Smith, which has been continued (50) by Smith in each issue of *Public Opinion Quarterly* since 1937. Current propagandas are analyzed in the latter magazine, published by the Princeton School of Public and International Affairs; and in *Propaganda Analysis*, monthly newsletter of the Institute for Propaganda Analysis. The following article represents merely a brief effort to evaluate a small number of the most outstanding titles.

scientist and psychopathologist, wrote the pioneer analysis of *Propaganda technique in the World War* (21), still the standard work on the subject. In it he compared the propagandist aims, techniques, and achievements of all the major nations. His work was based on field research and consultation of archives in Austria, England, France, and Germany as well as in the United States. Paxson, a widely known American historian, was prominent in the War Plans Division of the U. S. General Staff and was one of three editors of the *War cyclopedia* (56), published in 1917 by the Committee on Public Information (official American government propaganda agency). The first volume of his *American democracy and the World War* (40) traces the rise of social tension through the pre-war years, 1913-1917; the second covers the period 1917-1918. While not primarily concerned with war propaganda, these volumes are an authoritative exposition of its influence and of the social context within which it operated. Bruntz (5) and Peterson (41) devote themselves more explicitly to the analysis of propaganda techniques and results, and have much enriched our understanding of Allied propagandist achievements.

Less scholarly, but more popular, histories devoting considerable space to the effects of wartime propaganda, especially British propaganda in the United States, have been written by Walter Millis (36), well-known correspondent for various conservative U. S. newspapers, and by C. Hartley Grattan (16), free-lance journalist and author of a number of books on public affairs.

Among the most telling of the memoirs of World War statesmen are *Secrets of Crewe House* (53), by Sir Campbell Stuart, British propaganda chief, and *How we advertised America* (8), by George Creel, ardent newspaper editor and Wilsonian idealist who became head of the American propaganda organization (Committee on Public Information). George Creel's *Complete report of the chairman of the Committee on Public Information, 1917, 1918, 1919* (57) is also available. It may be supplemented by reference to *Words that won the war* (38), a reconstruction of the work of the Committee by two American historians, James R. Mock and Cedric Larson, who discovered its "lost" files after they had been neglected for nearly 20 years in the dusty basement of a War Department building.

A scholarly *German view of the effectiveness of World War propaganda* may be found in Dr. Hans Thimme's *Weltkrieg ohne Waffen* (55). The views of General Ludendorff, German army chief who came to feel that the war had been lost for Germany through

propaganda, are set forth in his memoirs (31). Techniques employed by German propaganda in the United States are described (58) by George Sylvester Viereck, a German-American journalist who was then active in this task. Effects of pro-German and anti-German propaganda on a plain soldier in the trenches are indicated by numerous scattered references throughout Adolf Hitler's *Mein Kampf* (20).

Propaganda efforts in connection with the European war which began in 1939 have been described by writers too numerous to mention. Few of these have achieved the candor or the theoretical level of the books cited in the preceding paragraphs. An outstanding exception to this statement is the work of Sidney Rogerson, British publicity and public relations specialist whose *Propaganda in the next war* (45) represents a remarkable achievement in objectivity. Useful also is *War propaganda and the United States* (27), by Lavine and Wechsler. For other titles, as they appear, consult the *Public Opinion Quarterly*.

Broad perspective may be gained from the elaborate annotated bibliography on *Civil-military relations* (19), prepared for the Committee on Public Administration of the Social Science Research Council by a staff under the direction of E. Pendleton Herring, secretary of the Graduate School of Public Administration, Harvard University. This bibliography describes a large number of major titles dealing with the war machines of the United States, Great Britain, Canada, Germany, and France. Although major emphasis is on the administrative problems of the Home Front, the implications for the total task of the propagandist are readily apparent.

Organization of the propaganda agency of the government would be a subject for extended treatment if space permitted. The agency must be highly effective, but must not *seem* to be effective, lest anxieties and a fear of censorship and news distortion be aroused. The agency must be rather highly centralized, to avoid the issuance of conflicting propaganda statements, but must not be so highly centralized as to reduce the morale of other significant Ministries of the government. Perhaps the most adequate discussion of these factors is found in Chapter 2 of Lasswell's *Propaganda technique in the World War* (21). Contemporary applications are made by Sidney Rogerson (45, pp. 166-176 and *passim*). Organizational problems are also discussed at length in publications of two U. S. political scientists: James L. McCamy's *Government publicity* (35) and Bruce L. Smith's *Suggested research in the public relations of government* (50).

The *relative utility of the various channels of communication* as means of propaganda is another topic deserving extended analysis. It may be assumed that all the major channels will be monopolized, or virtually monopolized, by any Great Power government in wartime. There still remains, however, the problem of the relative efficiency of the monopolized press as against the monopolized radio, the monopolized movies, and the virtually monopolized public meeting. Some light is thrown on this by the comparative study of *Radio and the printed page* (28), made under the direction of Dr. Paul F. Lazarsfeld, director of the Columbia University Office of Radio Research. The separate channels are discussed in a great number of books, listed in the Lasswell, Casey, and Smith bibliography cited at the beginning of the present article. Current titles are regularly listed or reviewed in the *Public Opinion Quarterly*. Since radio seems destined, according to the findings of Lazarsfeld and others, to play a much greater part in future wars than ever before, attention may be called to "New horizons in radio" (67), January, 1941, issue of *Annals of the American Academy of Political and Social Science*, containing a score of articles on radio as a social force in war and peace.

We may also single out two of the best-known and most comprehensive college texts that deal with the *psychology of public opinion* and the techniques of propaganda. *Public opinion* (1), by William Albig, University of Illinois sociologist, contains chapters on "Communication," "The Leader and Personal Symbolism," "Violence and Public Opinion," "The Measurement of Opinion," "Censorship," "The Art of Propaganda," and the various channels of propaganda (radio, motion pictures, press, graphic arts)—all of which are vital topics to the practicing propagandist. Charts and tables on the role of these forces and channels in the United States are also provided, along with ample bibliography. In *Propaganda: its psychology and technique* (11), Leonard W. Doob, Yale University social psychologist, sets forth a series of general principles.

A volume which might well have been used as a college text in public opinion before the appearance of Albig's and Doob's books is "Pressure groups and propaganda" (62), May, 1935, issue of *Annals of the American Academy of Political and Social Science*. This deals with propaganda efforts of farm, labor, business, professional, governmental, humanitarian, and other groups, in conditions of dictatorship and of democracy.

Vitally valuable *data on the prevailing state of public opinion* are found in the public opinion polls conducted by the firm of Elmo

Roper (the *Fortune* magazine survey) and by the American Institute of Public Opinion (the "Gallup poll"). Begun in 1935, these polls have now questioned the American people on more than a thousand topics. Their findings are conveniently summarized in each issue of *Public Opinion Quarterly*. For articles interpreting the results, however, it is advisable for the scholar or the practicing propagandist to refer to the original news releases sent out by the polls. The Roper poll appears monthly in *Fortune* magazine; the Institute poll, two or three times weekly in the *New York Times* and other papers. Without necessarily intending to question the essential integrity of the two polls, statisticians, psychologists, and other scientists point out from time to time the need for caution in accepting the interpretations offered in these news releases. For a symposium of authorities on this highly controversial question, see "The polls: Dr. Jekyll or Mr. Hyde?" in the *Public Opinion Quarterly*, June, 1940 (66). The point of view of the American Institute of Public Opinion is found in *The pulse of democracy* (14), in which Dr. George H. Gallup and Saul F. Rae analyze both the statistical techniques and the social consequences of polls.

(2) *Works on Morale at Home*. Modern war is total war, involving many considerations that are unfamiliar and distasteful to Americans. In modern war, in Great Power states like Germany, Russia, and the United States, there is inevitably a staggering drain on national income, national labor power, and national consumer standards. About 50% of the national income is used for the purchase of war materials. About 50% of the national labor supply is used to produce and transport these war materials (even after all available women and children have been put to work). About 50% of the factories and workers are therefore withdrawn from production of consumer goods, like shoes, clothing, houses, and food. As a result, the man in the street is obliged to undergo a series of sacrifices he did not anticipate. Even with inflated wages and salaries, he cannot buy goods that are not being produced. Discomforts and discontents of many kinds are consequently endured by all strata of society, except those at the very top of the pyramids of income and privilege. If the war becomes protracted, as appears probable in the current situation, even the latter may be exposed to a measure of discomfort.

In previous (limited) wars, like the World War of 1914-1918, no such level of industrial and civilian mobilization was contemplated or achieved. Even in Germany, which went the greatest distance in that direction, only about half the totalitarian level of

mobilization was achieved. The United States, of course, achieved a very modest level of mobilization indeed, although it appeared impressive by the standards of that day—or indeed, by any peacetime standard. Hence it may be argued that this country's lack of experience in the sacrifices and discomforts of total war is likely to produce a very delicate morale problem if America enters the current war. Much more attention than ever before will therefore have to be paid to propaganda on the Home Front.

Properly organized propaganda, disseminated on a large enough scale, may serve over a term of years as a substitute for butter, and even as a substitute for bread. In the total war situation, however, the propagandist must be more wary than in any other social situation presented by the Great Power state. His wariness is made necessary by two factors: (1) the extremely high level of sacrifice exacted from his public; (2) the extremely high probability that the rewards gained by his public, either in tangible realities or in pleasant fantasies (security, conquest, glory, raw materials), are not likely to appear proportionate to the sacrifices made to obtain them. The instability of public emotion under such conditions may lead to unexpectedly hostile attitudes toward persons in authority.

Hence it may be dangerous in the extreme for the propagandist in a total war to base his assumptions entirely upon the bibliography that has grown out of previous types of social crisis. It probably is true that equally high levels of sacrifice were exacted by the Thirty Years' War in Germany and by the World War in certain parts of Eastern Europe. But these two situations were not industrial situations, and the personalities involved were not Americans. The American Civil War perhaps exacted correspondingly high levels of sacrifice from the South, but again it must be remembered that these sacrifices did not take place under industrial conditions. Unfortunately, the behavior of Americans in situations of industrial conflict has only begun to receive scientific study, notably in the 1939 *Yearbook* of the Society for the Psychological Study of Social Issues (18). Probably a majority of scientific reviewers would feel that the symposium in this *Yearbook* has numerous shortcomings. Nevertheless, it might also be felt that these efforts represent the most nearly adequate approach available at present. Especial attention may perhaps be called to the article therein by Arthur W. Kornhauser, University of Chicago psychologist, "Analysis of 'class' structure of contemporary American society: psychological bases of class divisions." This

may be compared with an article (51) on "Class structure and 'total war,'" by Hans Speier, specialist in the sociology of war, New School for Social Research; Speier analyzes the Great Power state to determine the role of each class during total mobilization.

Attention may also be called again to the Social Science Research Council's extensive annotated bibliography on *Civil-military relations* (19).

Perspective may also be gained from a German point of view in Friedrich Schönmemann's analysis of America's propaganda on the Home Front during the World War (48) and from a British point of view in Chapters 4 and 5 of Sidney Rogerson's *Propaganda in the next war* (45).

A rather unusual attempt to cope with morale problems on the Home Front is found in *Speak up for democracy* (3), by Edward L. Bernays, public relations counsel for many big businesses. In this, the author urges the "average American" to learn all the techniques of public relations in order to "speak up for democracy" and in order to be able to appraise and resist the antisocial types of propaganda. To this end, such full instructions are given that the book might well become a manual for the publicity or public relations man engaged in almost any other type of campaign.

Finally, social scientists have compiled two symposia on modern war, describing many of the social situations on the Home Front. The first, edited by Willard Waller (60), contains a chapter on "Propaganda and Public Opinion," by Ralph D. Casey. The other, edited by Hans Speier and Alfred Kähler (52), contains an essay on the same topic by Dr. Speier.

COMMERCIAL PROPAGANDAS

In the last few decades the principal business executives everywhere have seen fit to expend vast sums on advertising and public relations—especially in the United States, where the annual outlay for this purpose has approached two billion dollars in recent years. This has led to the growth of hundreds of advertising firms, scores of public relations counsels, and several thousand press agents, publicity men, "information" directors, and consultants on promotional activity. Along with the growth of this new class of specialists has come a vast outpouring of books and articles dealing with the special promotional activities of each and every industry and profession. Most of them, however, are of merely transient importance to the general theory of propaganda. Yet among the standard treatises on advertising and public relations

for private profit a few may be cited as likely to enjoy a more permanent status.

One such book is *Propaganda*, by E. L. Bernays (2), public relations counsel. Standard treatises on advertising are those by Borden (4), of Harvard Business School; Durstine (12), well-known advertising man; Sandage (47), of New York University; Goode (15); S. R. Hall (17); and Poffenberger (43).

Journalism, in the sense of newsgathering and newspaper publishing, is regarded by many as an appendage of advertising, industry, and banking in the United States, inasmuch as (1) some 70% of the revenues of all papers come from paid advertising, not from the selling of news; (2) publishers of most U. S. metropolitan newspapers operate their papers incidentally, or as promotional adjuncts, to their main investments in banks, mines, industries, and transport systems. Three volumes perhaps summarize those aspects of the social control of journalism which it is absolutely essential for the propagandist to bear in mind. Desmond (10), a widely experienced reporter, teacher, correspondent, and editor, summarizes the customs and living conditions of journalists in a score of countries and describes the facilities of the main news arteries of the world. Alfred M. Lee, professor of journalism and sociology, New York University, and member of a New York public relations firm, analyzes (29) two centuries of interaction between the press and social life, supplementing, for this country, the data in the world survey by Desmond, cited above. Also valuable is a volume (44) by Riegel, an experienced correspondent, now professor of journalism at Washington and Lee University, who analyzes the main newspaper, radio, and cable channels and describes their "enchainment" in the service of nationalism and large vested interests. Perhaps no survey of this field would be complete without reference to the various sections on journalism in Lundberg's *America's sixty families* (32), showing the extent of control over the larger papers by the larger fortunes. Radio journalism, an important new development, has not yet been written up in any major work.

HUMANITARIAN PROPAGANDAS

Techniques of humanitarian propaganda have not been as elaborately or expensively developed as techniques of propaganda for war, profit, or revolution and counterrevolution. Nearly all of the more accomplished professional public relations and propa-

ganda experts have preferred big pay and big excitement to welfare work. Nevertheless, there has been a considerable flow of welfare propaganda, although often of a secondary or homemade quality. A society accustomed to a measure, however small, of humane propaganda, will miss it acutely in wartime unless the official propagandist includes in his own work a due proportion of humanitarian appeal. He can do this most effectively by appraising and imitating the work of the welfare propagandists.

A wide variety of humanitarian propagandas are briefly described by a number of different authors in "Pressure groups and propaganda" (62), May, 1935, issue of *Annals of the American Academy of Political and Social Science*. Among those treated are social workers, religious groups, professional groups, farm and labor groups, and others.

Hospital public relations would appear to be a good starting point in times of total war. Outstanding work in this field is by Alden B. Mills (37), managing editor of *Modern Hospital* magazine. Modern public health campaigns, as well as the other aspects of a well-rounded social work campaign, are perhaps most adequately treated by Mary S. and Evart G. Routzahn in their well-known treatise, *Publicity for social work* (46). This type of campaign is, of course, an extremely vital concern of the propagandist of total war, since even a purely local epidemic may cripple the entire assembly line involved in the war effort.

Closely allied is the problem of industrial psychology and industrial morale. Two leading treatises in this field are by Morris Viteles, *Industrial psychology* (59), and T. N. Whitehead, *The industrial worker* (61). Viteles and Whitehead, however, are more concerned with increasing production levels through changes in shop conditions than through changes in the propaganda environment. The propaganda approach is more explicitly set forth by Selden C. Menefee's essay, "Propaganda and symbol manipulation," and by various other contributors, in *Industrial conflict* (18).

Housing, another urgent wartime consideration, has not, to the writer's knowledge, been adequately written up from a public relations standpoint. General impressions of the problem may be gained from publications of the National Association of Housing Officials and the United States Housing Authority. Under war conditions, the long-range humanitarian aspects of housing are likely to be neglected in favor of speed and out of regard to steep declines in mass purchasing power. Propaganda may be used in attempts to restore contentment.

Education, like other humanitarian efforts, is likely to come to an unhappy pass in a world at total war. An attempt to foresee the situation and recommend practical adaptations is found in *Education in a world of fear* (34), by Mark A. May.

Mental health administration is a problem of similar character. It is obvious that only at their peril can the psychological managers of a Great Power state neglect to develop a mental health administration, even under conditions of dictatorship. A mental health administration is not only a means of reducing sabotage and mass uprisings, but an invaluable means of informing the propagandist of the prevailing state of public opinion, much more satisfactorily than through public opinion polls. As many writers have pointed out, the twin sciences of psychotherapy and psychopathology have produced far more insights for the practicing propagandist than any other branches of psychology. How he may avail himself of their findings is partly indicated in Lasswell's *Psychopathology and politics* (22). Economic aspects of psychotherapy, and the characteristics of the institutions through which it is administered in the United States, are fully described in *Mental health* (65), a symposium of a score of specialists in psychiatric, medical, and social research who were convened by the American Association for the Advancement of Science.

PROPAGANDAS OF REVOLUTION AND COUNTERREVOLUTION

The terms "revolution" and "counterrevolution" must be interpreted in careful relation to their contexts, for many reasons. In the first place, revolution in one country is often contingent upon, or labeled as, counterrevolution in another. Secondly, struggles that begin as nationalistic wars may develop into national, continental, or world revolutions. Thirdly, propaganda intended to have revolutionary or counterrevolutionary effects may have the reverse effects in practice, so that a later historian may be baffled in trying to classify it. Thus, Germany's plutocrats, supporting Hitler to gain a counterrevolution, found that they had in fact financed a revolution of the lower-middle classes, leading to a war that may result in deeper revolution by an even more underprivileged social stratum.

If one seeks to use the word "revolution" in a scientific sense, it may be used to refer, in our times, to efforts of lower-middle-class or laboring elements to overthrow existing plutocratic and bureaucratic strata. It is evident that either revolution or counterrevolution, in our times, is more than likely to lead to dictatorship.

Hence, the bibliography of the theory of revolution is inextricably bound up with the theory of dictatorship.

Principal theorist of the lower-middle-class revolution is Adolf Hitler, whose chapters on propaganda in *Mein Kampf* (20) are known the world over. Since Mr. Hitler, however, does not explain himself to the full satisfaction of social scientists and psychopathologists, his work has received the attention of countless commentators, among whom we may name Harold D. Lasswell, "The psychology of Hitlerism" (23); and the authors of a symposium on *Propaganda and dictatorship* (7), edited by Harwood L. Childs, Princeton political scientist. Another comprehensive symposium of recent years is *Dictatorship in the modern world* (13), edited by Guy Stanton Ford, University of Minnesota historian who earlier held an influential position with the Committee on Public Information. This contains some 15 articles by social scientists on the economics and politics of dictatorship and their effect on various groups in society. The essay on "The import and impact of organized propaganda" is by Peter H. Odegard, Amherst College political scientist. In a book on *The strategy of terror* (54), Edmond Taylor, *Chicago Tribune* Paris correspondent, tells something of German efforts to promote a lower-middle-class revolution in France and England.

Both war and revolutionary propagandas of the working class are placed in perspective in Lenin's *Agitation und Propaganda* (30), a German-language treatise not available, to the writer's knowledge, in English. Perhaps most adequate among the English-language treatises on propaganda by ardent sympathizers with a workers' revolution is *The rape of the masses* (6), by Sergei Chakhotin (or Tschakhotin), Russian biologist, psychologist, and disciple of the celebrated reflexologist, Ivan Pavlov. In a somewhat more detached and scientific vein is a study of *World revolutionary propaganda* (25) in Chicago, by Lasswell and Blumenstock. This volume is a major contribution to social science from a methodological angle: it represents the first attempt to take actual measurements of the volume and effects of every medium of propaganda in the revolutionary movement of a large city. For those who have not time to read such major works as the three just cited, the most comprehensive and pungent of the briefer treatments is probably the essay by Lasswell, "The strategy of revolutionary and war propaganda" (24). For a careful analysis of social structure and propaganda in terms of a possible merger of the lower-middle-class and the proletarian revolutions, consult *Man and society in an age*

of reconstruction (33), by Karl Mannheim. Trained in both psychoanalysis and social science, this German scholar (who has left Germany) explores the problem in a thorough and realistic way, despite inordinately complicated terminology.

Democratic ideology has been so popular in recent years that explicitly counterrevolutionary theories are rather hard to find. Both Hitler and Stalin, it may be recalled, refer to their regimes as revolutions of the common man. Modern dictators and reactionaries have preferred to rule by censorship and casuistry, not by overt avowal of counterrevolutionary aims and methods. Therefore the classic of counterrevolution is still *Reflections of a Russian statesman* (42), by Konstantin Pobedonostsev, Minister of Education under the Czar Alexander III. This master propagandist held that democratic notions lead necessarily to "moral debasement, corruption and unscrupulous demagoguery," while "freedom of speech is freedom of lie and freedom of the press is even more nefarious." Even jury trial, he said, is "absurd and idiotic." His *Reflections* show how this Czarist sought to stamp these freedoms out. Since his day, no major treatise taking this point of view has appeared, although many of the more extreme passages in Hitler (20) and Mussolini (39) reveal a similar objective and similar counter-propaganda method. Such overtones are also found in books by the American fascist theorist, Lawrence Dennis, whose *Dynamics of war and revolution* (9) discusses the propagandist claims of a "new American elite," which he says is destined to seize power within a few years. Most specialists in propaganda analysis seem to believe, however, that if a fascist seizure of power is made in this country, it will be done with no such overt propaganda. If it comes, it will come by indirection, probably in the name of a war for democracy.

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PSYCHOLOGICAL CAUSES OF WAR

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A consideration of the psychological causes of war must be partially but not completely divorced from the politico-economic causes of war. The latter may be considered as concrete circumstances upon which such emotional values are placed that men will wage war to achieve or to avoid them. Psychology is charged with the task of determining why and how these emotional values come to be so fixated.

Early discussions of the psychological causes of war (5, 15, 23) relied heavily upon such discarded concepts as the crowd mind, the herd instinct, and the pugnacious instinct. LeBon (15) considered that Germans and Frenchmen inherited different "racial characters" (in almost the same paragraph as the assertion that there are no pure races in Europe!) and that each individual has a racial mind which dominates his behavior when the nation is in peril. Some variants upon this theme appear today in popular discussions of "the German character" and "race-impulse." I need hardly point out that there is no evidence for the assumption that Germans are inherently different from the English, the Dutch, or the French.

Aside from these three items, which are included as *exempla horrenda*, I have tried to limit the present survey to items (1) written by competent scholars and (2) having some point to make which seemed to merit inclusion. Obviously, I have excluded all the vast literature on politico-economic causes of war and also much which is stimulating in the popular field. For purposes of organization I have grouped the material as to theoretical viewpoint, namely: psychoanalytic, modified psychoanalytic, frustration-aggression, behavioristic, and institutional. (This classification is open to many criticisms and is to be taken purely as a convenience.)

Psychoanalytic theory tends to shift the problem of the causes of war to an examination of the extent to which libidinal and aggressive impulses become attached to national symbols. It is asserted that libido (love) becomes attached, in the normal course of events, to symbols of "our" group, and destructive urges to

symbols of the out-group. Hopkins (13) takes the position that this is a common method of resolving the Oedipus complex, the father-image being split into a good fatherland and a bad enemy land. Some of the qualities of the mother are also attributed to the homeland, and the "rape" of the mother country fills patriots with indignation. Most of the analytic contributions accept this version of patriotism and give some evidence supporting it.

Freud's inherent "death instinct" gives rise to considerable controversy, with Glover (10) and Menninger (19) supporting it (but conceding that war may none the less be ultimately abolished) while others doubt or criticize this conception (1, 11, 20). Both groups maintain that aggression occurs, that it can be displaced from immediate personal objects to social symbols, and that it could be sublimated in other ways than through war. Even Freud at times wavered on the question of inheritance of the aggressive impulse.

The best contribution tying up studies of children, animals, and adults in a psychoanalytic framework is that of Durbin and Bowlby (9). They also give consideration (which most psychologists have not) to the manner of thinking about foreign nations as a source of conflict attitudes. It is unfortunate that they seem aggressively to reject the notion that political and economic factors help cause wars.

The little pamphlet published by the Netherlands Medical Association's Committee on War Prophylaxis (21) includes some essays from a psychoanalytic viewpoint and others of a more traditional type. All are interesting. It is deplorable that American professional bodies have not followed the lead of this courageous little group in campaigning for public education on social problems.

In the second group of items we have placed several contributions which differ only slightly from the preceding. Allen (2) finds a significant contribution to nationalism and group solidarity in sublimated homosexual impulses. The argument, too long to summarize here, merits serious study. Waelder (24) has extended psychoanalytic concepts to the formation of groups in an interesting fashion. While his distinction between "associations" and "masses" is superficial, he has many important suggestions with regard to the greater violence and reduced rationality of the individual in a group situation, *e.g.* that the national leader may take over the function of the superego (conscience) so that the restraining influence of taboos is lifted.

The most thorough (and most formidable) examination of the interrelationships of politico-economic and psychological factors in the production of international rivalry and war is that of Lasswell (14). The author moves, with a facility which is often bewildering, from tariffs to castration complexes and from specialists in violence to symbol formation. Some of the formulations are undoubtedly imaginative, but there is a solid background of fact, and some later work appears to confirm what was only speculation when the book was written.

Doob (6) has applied the frustration-aggression point of view to the war problem, with results which are somewhat easier reading for the average American psychologist than most of the preceding. Contact with political and economic reality is also maintained throughout. Bird (4) gives a similar treatment, with more emphasis on attitudes and measurement data.

F. H. Allport (3) offers an approach to war causation which emphasizes the concrete behaviors of individuals, acting primarily in their roles as units in the functioning of institutions. The viewpoint is novel and stimulating. In my opinion the problem of dynamics is not adequately handled, but there are suggestions that the author has more to say than has yet been published.

The anthropological literature on war has much to offer to the psychologist, but it is impossible to review it here. Mention should be made of the paper by Malinowski (16), which bears on the question of what kinds of fighting may be indulged in by groups (although he attempts erroneously to distinguish between individual fighting and group conflicts as being qualitatively different).

Finally, we may mention a group of more or less eclectic contributions (7, 12, 22) which give good treatments of certain important points. Dulles (7) has a particularly good interpretation of our personified thinking about the Nation-Hero and the Other-Nation-Villain (discussed in better theoretical form (9, 13) by the psychoanalysts). Stratton (22) has done an excellent job, in popular form, of showing how delusions about our nation and other nations come to be so strongly emotionalized. Although his book is five years old, some of the comments are strikingly contemporary. Handman (12) argues that much of the alleged economic conflict between nations is really a question of power for national leaders—a point the accuracy of which can hardly be questioned, although it seems stretched too far in many instances.

The article by Dunlap (8) raises the question as to whether we are entering a new period of theological dogma in social psychology.

The author (whose discussion of war prevention is quite sound) devotes most of his discourse on the causes of war to a denunciation of the "Communazis" in this country. This is reminiscent of the three books (5, 15, 23) published during the first World War, in which national policy is faithfully reflected in alleged scientific formulation of problems. It is clear that psychologists are going to be faced, very shortly, with the choice that faced Galileo and Descartes—between a rigidly scientific approach to social behavior and one biased by a nationalistic, patriotic ideology. If contributions on the war-making activities of individuals are to be adjudged on the basis of aiding Hitler, instead of their logical and scientific merits, social psychology will shortly lose all of its recent gains. We need the same nontheological attitude in social psychology that prevails in the fields of chemistry and physics. This is particularly appropriate when we reflect that all of the best contributions reviewed here conclude that excessive patriotism is a major cause of war, and that the freeing of thinking from the bonds of emotional complexes such as nationalism is a necessary preliminary to the development of plans for a permanent peace.

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REHABILITATION¹

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For the purposes of this review, rehabilitation is defined as the steps taken "for the functional restoration of an individual who has become unable to hold his place in the social life of his community" (13) as a result of a physical disability. While recognizing the broad social functions of rehabilitation (13, 30), the emphasis in this review is nevertheless upon *occupational restoration*, since this is generally the major objective of rehabilitation programs.

The application of psychology in restoring the physically handicapped to work must be based upon a knowledge (a) of what has been accomplished and (b) of problems experienced in the development and administration of rehabilitation programs. Of interest in this connection is a series of bulletins issued by the Federal Board for Vocational Education. Bulletins published towards the close of the First World War (31, 52) formulate the basic principles of rehabilitation, describe American and foreign legislation and experience, and provide extensive bibliographies drawn from international sources. Later bulletins (59, 61, 65) deal with the evolution of the vocational rehabilitation movement as applied to the civilian population, including a discussion of the relation of vocational to other types of rehabilitation (65), a description of Federal (65) and State programs (61), and specific recommendations for the organization of rehabilitation programs.

The Federal Board for Vocational Education bulletins on programs and practices are supplemented by the findings of follow-up studies (56, 58) devoted to the survey of what has been accomplished through rehabilitation activities; to an analysis of occupations held by the physically disabled as a basis for making judgments on jobs suitable for workers with various kinds of disabilities, etc. One such study (56), of 6097 physically disabled persons in 628 occupations, leads to the conclusions that (a) placement possibilities are much more diverse than is ordinarily supposed to be the case and (b) the range of adaptability of the physically handi-

¹ The writer gratefully acknowledges the considerable assistance given by Franklin M. Phillips and Jean M. Goldstein in the preparation of this review.

capped is wider than anticipated. To implement facts on programs, methods, and vocational opportunities for the physically disabled are plans, prepared during the last war, for training teachers for occupational therapy and rehabilitation of disabled soldiers and sailors (53) and a more recent manual of procedures (64) for use by rehabilitation workers in counseling and in placing the handicapped.

Apart from the Federal Board for Vocational Education bulletins, discussed above, there is a wealth of material on the history, principles, and practices of rehabilitation. This ranges from reports on vocational practices in the rehabilitation of military personnel during and after the last war (3, 44, 45, 49, 54, 57), through a consideration of problems and practices in the rehabilitation of physically handicapped civilians (25, 26, 27, 32, 33, 60, 63), to a description of steps taken in the rehabilitation of those injured during the Spanish prelude to the present World War (40).

Of particular significance in setting the groundwork for improved practices are studies, involving specialized physical disabilities, made during the comparatively quiet period of the '20's and '30's. In general, it is found that the crippled and cardiacs (5, 9, 10, 16, 32, 35) may be quite readily adjusted to a large variety of occupations. Anderson (1), in a survey of 4400 white orthopedic cases, finds somewhat fewer voluntary and involuntary terminations in handicapped as compared with nonhandicapped groups. In one industrial plant (10), physically handicapped workers, placed in jobs found suitable by careful job analysis, displayed a better record on sickness, accidents, and rate of increase in earnings than did normal workers. A New York agency (35) reports successful placements of cripples and cardiacs in stores, factories, garages, hotels, hospitals, and private homes. Other agencies report that selling, beauty culture, stenography, farming, and teaching are among the jobs successfully filled by those profiting from an adequate program of vocational rehabilitation (9).

While the traditional occupations for the blind, such as brush-making, caning, knitting, piano tuning, etc., are becoming overcrowded, other outlets are available in occupations not formerly considered in the rehabilitation of this group (6, 11). Semiautomatic machine operation (7), shoemaking, coöperage, massage, stenography, cabinetmaking, and factory assembly jobs (46) are cited as examples of occupations in which the blind have been satisfactorily adjusted subsequent to training.

For the deaf, according to Odencrantz (34), training tradition-

ally covers approximately 20 occupations, such as upholstery, printing, sign painting, gardening, and tailoring for the males; millinery, needlework, artificial flowermaking, and cooking for the females. However, various studies (34, 62), including an investigation by the U. S. Office of Education (28) of close to 20,000 subjects, which is particularly informative with respect to the occupational status of the hard-of-hearing, show frequent disparities between the occupation followed and that for which the deaf person was trained. Specific recommendations designed to correct this situation are found in a report on a survey of graduates of the Illinois School for the Deaf (62).

Professional occupations, jobs in offices and salesrooms, and a great variety of manual jobs are suitable for those cured of, or recovering from, tuberculosis (24). Tubercular hospitals, according to many workers in this field (8, 21, 22, 43), may be turned into vocational schools preparing patients for occupational adjustment subsequent to an arrest of the tubercular condition. However, both the character of this disease and its physical and mental effects make particularly necessary a survey of individual interests, aptitudes, and related factors as a basis for permanent rehabilitation of the tubercular (15, 24).

Throughout the general literature on rehabilitation there are many references to the areas within which psychological principles and techniques can be applied. On the other hand, there are few general articles dealing specifically with the scope, method, and results of psychological research and practice in rehabilitating the disabled. For this reason, special interest is attached to an article by Baldwin (2), dealing specifically with the function of psychology in the rehabilitation of disabled soldiers. Included in this are descriptions of methods used in surveying individual capacities, interests, skills, and attitudes; of progress in applying psychological principles of training; of procedures for studying morale; and of other techniques used in connection with occupational therapy and rehabilitation of patients at the Walter Reed Hospital between April, 1918, and April, 1919. Fundamental psychological principles and methods are also considered in detail by Poppelreuter (39), who discusses the construction and use of tests and the application of "work curves" and of "rational" training principles in rehabilitating the industrially handicapped. General features of the psychological approach are also discussed by Hill (20) and McMurtrie (30).

In general, the applications of psychology as discussed in pub-

lications dealing with rehabilitation can be divided under five headings:

(1) Occurring most frequently are references to *the use of interview, tests, and other techniques in determining the capacities of patients to profit from training in particular occupations or occupational fields*. Shairp (48), for example, stresses the importance of basing rehabilitation upon an adequate consideration of individual differences. Suitable examinations to determine the individual's capabilities for re-education are recommended in the report of a conference (51) on re-education and rehabilitation meeting in 1917 under the auspices of the Council on National Defense. Giese (14), from a study of 70 deaf mutes in 39 occupations, concludes that low efficiency in these occupations is a result of deficiency in aptitude on the part of those who fail rather than of the sensory abnormality of the deaf. Prevocational analysis to determine vocational possibilities is one of the recommendations following from the study of vocational abilities of students graduated from the Illinois School for the Deaf (62). Hudson (22) stresses the measurement of interests and aptitudes as well as consideration of background and employment trends in planning training programs for the tubercular. Hayes (19) presents a critical, historical account of the use of standard intelligence and achievement tests in schools for the blind.

(2) Throughout the literature on rehabilitation are references to *the use of psychological methods in analyzing the mental attitudes of patients and in developing attitudes favorable to effective adjustment*. So, for instance, in the discussion of occupational therapy there is frequent emphasis upon the psychological aspects of such treatment in building up attitudes favorable to rehabilitation (36, 47, 50, 53, 55). Kessler and Reznikoff (23) discuss the personality problems which interfere with rehabilitation, and Reznikoff (42) describes procedures employed in making a personality evaluation designed to reveal the individual's feelings about his disability as a basis for constructive rehabilitation.

(3) *The application of principles of learning and other psychological principles in facilitating the acquisition of skill* receive attention in a few publications. Franz (13) stresses the processes of habit formation in the functional restoration of the disabled, while Poppelreuter (39) discusses the specific application of learning curves in the re-education of the disabled.

(4) Of interest in articles and pamphlets dealing with rehabilitation are references to *the use of appropriate techniques for creating*

public opinion favorable to programs of vocational rehabilitation and, more particularly, to the employment of the physically handicapped. Billings (4), for example, refers to the need for using "propaganda" in shaping public attitudes favorable to rehabilitation programs. Hill (20) recommends the use of "propaganda bureaus" to bring about the intelligent coöperation of civilians and soldiers in the rehabilitation program. McMurtrie (29) and Persons (37) discuss the importance of enlisting the coöperation of the employer. Pless (38) insists that parents and teachers, as well as the general public, must be educated to coöperate in constructive programs for adjusting those handicapped by hearing defects. In the publications of the Federal Board for Vocational Education, noted elsewhere in this review, there are many references to the problem of creating public opinion favorable to rehabilitation programs. In general, although there are few references to the use of psychological techniques in measuring and directing public opinion, there appears to be indicated an area in which methods devised by psychologists can be usefully employed.

(5) *Studies of the special abilities and disabilities of the physically handicapped* are included in the literature on rehabilitation. Russian investigators (41) find that hand-movements of the blind, although fairly exact, are less accurate than those of normal subjects. Hayes (17) concludes that instances of increased acuity of the blind in other sense realms represent the effect of training rather than of congenital superiority. According to this author, attentive practice, and not inherently superior discrimination, accounts for the extraordinary skill sometimes displayed by the blind in guidance through hearing, pressure, and other senses. The same author (18) reports the results of experiments in sound localization which point toward possible compensation through other senses in practiced activities. Fox (12), on the basis of an intensive investigation, concludes that there is "no sixth sense" or "intensification of the senses" in the blind. Blind persons can acquire real skill only in those activities which are truly independent of vision in that effective substitutes for visual control can be developed. One of the outcomes of this research is a plan for constituting groups of normal-sighted and blind individuals for the most effective performance of related operations in industry.

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WAR NEUROSES¹

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On the basis of observations made on the war neuroses during the World War and more recently, certain general conclusions may be drawn. It may be stated that such neuroses show essentially the same mechanisms, somewhat modified by war conditions, as those of civil life. The clinical pictures are similar, particularly to the traumatic neuroses of peace, with the psychosomatic problem playing a more important role than was recognized in the last war. Basic therapeutic principles are essentially the same as in civil life with the important exception that treatment methods must be, at times, limited in scope and must aim toward returning casualties to duty as soon as possible. As present warfare is so very much directed against civilians, in speaking of the neuroses we make no differentiation between cases occurring in the civil population and among troops. Finally, terms such as "shell shock" or "soldier's heart" should be avoided because of their unfavorable connotations.

It has been our aim in this bibliography to present the most significant of recent papers on the war neuroses and to include references which have not appeared in earlier bibliographies. There are 57 titles selected from over 130 articles published since 1927. That date was chosen because it marked the year of publication of the comprehensive bibliography by Fenton and Morrison on American contributions to military neuropsychiatry (17). Foreign articles for the war years may be found in abstract in the bibliography published by Brown and Williams under the auspices of the National Committee for Mental Hygiene in 1918 (9). The survey of the German war literature by Karl Birnbaum, which was begun in 1915 and carried on throughout the war, is another valuable reference work (5). Volume X of our own government publication, *The medical department of the United States Army in the World War*, contains a wealth of excellent material on the war neuroses (58). In addition there is a bibliography, apparently privately circulated (1918), by Thaddeus Ames which contains

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many important early references (1). The National Committee for Mental Hygiene (Canada) is sending out a series of bulletins on *Mental hygiene and the war*. These bulletins contain excellent abstracts of recent contributions and short special articles dealing with the field (62). Finally, there is the admirable survey and bibliography in *The neuroses of war*, published under the editorship of Emanuel Miller in 1940. This covers the literature of the World War period thoroughly and gives scattered English references up until the Summer of 1939 (32).

There can be no real question regarding the important problem that the war neuroses presented during the first World War. It is difficult to obtain any accurate estimate regarding incidence (32). The limitations of space prevent inclusion of available statistics. It is sufficient to say that a real psychiatric emergency appeared in 1916 (2, 19, 28, 42, 54, 59). The problem of nervous and mental disorders becomes, and became, increasingly important with the duration of military activities (49). During the great offensives the neuroses made up 40% of the British casualties evacuated from France (32). Prior to the onset of the present war it was freely predicted that there would be a tremendous increase in psychiatric casualties due to the more direct involvement of the civilian population and the terrors which would be engendered by bombing, gas, and bacterial attacks (10, 16, 32, 35, 38, 40, 54, 56). However, evidence began to appear which would tend to show that the civil population maintains a surprisingly high resistance and adaptability under most disturbing conditions (40). Particularly impressive was the evidence from the Spanish civil war as reported by Mira (33, 34). Our more recent information comes almost entirely from England, due to breakdown of communication with the Continent and to censorship. Anna Freud and Glover reported almost no increase in neurosis as a consequence of the great raids beginning in September, 1940 (24). However, they were still in private psychoanalytic practice, and reports from psychiatrists at first-aid posts in London hospitals connected with the Emergency Medical Service present a somewhat different picture. From such sources one finds evidence of psychiatric casualties in good numbers (one-seventh of the patients at St. Mary's Hospital, according to Pegge) (37, 40, 47). The most interesting and informative of the recent reports, including a discussion of war strain in children, comes from the Tavistock Clinic (61).

To turn now to the occurrence of war neuroses among troops, we have reports of a considerable number of such casualties follow-

ing Dunkirk (7, 11, 13, 15, 43). On the other hand, Yellowlees states: "True war shock or anything remotely resembling it has not yet arisen." This appears to have been written following service in France but prior to the evacuation (57). Hincks gives some rather significant figures on the Canadian forces. Speaking in New York in the Fall of 1940, he reported that 16% of the men invalided home from England since the outbreak of this war have suffered from neuropsychiatric disability and an additional 26.5% had duodenal ulcers—a condition frequently associated with emotional disturbance and tension (22). It would seem fair to conclude that the incidence of the war neuroses among civilians and troops is not so great as anticipated prior to this war. But, given such siege-like conditions as Dunkirk or a continuing strain such as has been present in England since the great air raids began, the incidence will probably approach that of the last two years of the World War among troops and will be considerably higher among civilians.

One finds little new in the recent literature regarding etiology. There are two major schools of thought. One is rather strikingly manifest in a recent leader in the *Lancet* (60). There seems to be a strong tendency to consider all neurotic reactions as predominantly constitutionally determined with an inherited predisposition. This is particularly prominent in the recent German literature on this subject (6, 21, 54). To some degree it is found in the articles by writers of a strongly neurological orientation (35, 41, 42). The *Lancet* leader provoked discussion mostly representative of the other point of view (7, 12, 53). Those who hold this point of view would accept the importance of inherited predisposition in some cases and of the effects of previous neurotic personality disorder in most, but would also stress the fact that many soldiers of reasonably sound personality may break if the strain is severe enough or too prolonged (4, 11, 15, 16, 20, 32, 43, 44, 48, 54). Naturally, under similar strain, those predisposed as a consequence of inheritance or early environmental stress will break soonest, and in many cases the neuroses appearing before exposure to battlefield conditions will have the most chronic and incapacitating symptoms (32). The strain under field conditions may be mental or physical or both, with fear, shock, lack of food or sleep, exposure, etc. playing prominent precipitating roles. Maskin has recently published a thorough survey of the literature on the psychodynamics of the war neuroses (30). Kardiner's monograph gives a new and important orientation from the point of view of ego psychology (25). Wietfeldt presents an interesting comment on the war neuroses of

1914-1918 appearing in relation to the psychic isolation and emotional impoverishment of the common soldier (55).

The best means of prophylaxis is through proper selection of recruits. This is a conclusion, now widely accepted, which derives from the American experience in the World War. One finds emphasis on this point in nearly all the references. It is particularly well expressed by the American authors (49, 50, 51) and by Maier (28). But, with more direct involvement of the civil population, there has been some agitation for retention of the potentially neurotic individual under military control as a means of preventing psychic contagion and panic (6, 35, 53). The need is stressed for giving regimental medical officers more information regarding the war neuroses and their prodromal signs (20, 36, 42, 45). Guarding against breakdown in civilians is the subject of several authors (10, 35, 38, 48, 56). This whole field is very well covered in *The neuroses of war* (32).

In the Home Forces of the American Army, it is said that about half of the psychoneurotics broke down within a month of induction and 84.5% were detected within six months (58). The change of occupation, separation from the family, and submission to a new form of discipline were important in breaking the more fragile individuals (32). Approach to the battle area brought out another crop. In spite of the careful selection methods and elimination of the potentially neurotic, there were 32,983 admissions, in the American Expeditionary Force, of enlisted men suffering from functional nervous disease between the dates of January 1, 1918, and July 1, 1919 (32). This figure would include men from the regular army, National Guard, and the first draft who were not so carefully surveyed before embarkation, but it would also include 8640 men on whom the neuropsychiatrists were overruled in their recommendation that they be withheld from service in France. This last figure is rather interesting, as the total number of nervous and mental cases occurring in France and evacuated home between January 1, 1918, and July 1, 1919, was 8772. It is to be presumed that the balance of the total admissions were returned to duty (58). One finds particularly good papers on the varying incidence of these disorders in France as related to the varying conditions of active warfare (26, 43, 49). During mobilization, hypochondriacal, neurasthenic, and psychasthenic syndromes appear more frequently. Under battle conditions, anxiety states and hysterias predominate. One finds variations in opinion regarding the neurotic disorder which is most frequent, depending on the

individual's point of observation. Dillon (16), working in an advanced post, reports a preponderance of anxiety states. Hurst (23) and Russel (41), apparently with more experience at the base, found the majority of their cases were hysterics. In this war, Crichton-Miller (32) presumes anxiety-hysteria will be the most common type of neurosis.

For the clinical picture of the various types, *The neuroses of war* (32) would seem adequate in spite of some unfavorable criticism by English reviewers. In any case, if one supplements that volume with Hurst's book (23), the criticisms would be met. Good clinical pictures of the present war casualties may be found under various reports (7, 11, 13, 15, 34, 37, 43, 47, 61). The casualties at Dunkirk are reported to have shown a surprisingly uniform clinical picture. The facies, bodily attitudes, and tremor were often most suggestive of a Parkinsonism. Tension and anxiety or a listless apathy was evident. Mentally, the patients betrayed either acute anxiety or depression. Insomnia, terrifying dreams, feelings of inner unrest were regularly present. The men were startled by the slightest noises, but particularly at the sound of planes or sounds of a similar nature (43). Mira describes some unusual, and sometimes fatal, anxiety states observed in Barcelona (34).

Treatment is adequately covered in *The neuroses of war* (32), with detailed description of various methods including Hypno-analysis and Narco-analysis. Early treatment is stressed as most necessary, as is the early recognition of psychosomatic conditions. Stress is placed on giving the patient not only intellectual, but emotional, insight. The dangers involved in removing symptoms without analyzing the underlying conflict is well recognized. The old conflict between the neurologist and the psychiatrist has made its appearance in England (7). Culpin speaks of this in a letter to the *Lancet* as "a recrudescence of the kick-in-the-pants therapy" (12). It is surprising how many of the psychiatrists—even in the Royal Army Medical Corps—have accepted psychoanalytic formulations and, at least, modifications of that method of therapy (29, 36, 57).

Finally, we come to the postwar problem. One finds reference to the many men who develop neuroses only on return to civil life. There has been considerable criticism of the methods of compensation and treatment of our psychiatric casualties from the World War (3, 14, 27). A study of this whole problem is urgently needed, including comparison with the Canadian system. It would seem that the Swiss too have much to offer (28).

Our selections have been chiefly from the American and British literature because of accessibility, but even more because we found the best articles there. The German references deserve a careful survey. One French reference is included as a typical example, but they have little to offer (39). If one is interested in their approach to the problem, we may recommend a survey made by Bailey and included in the A. E. F. section of Volume X of *The medical department of the United States Army in the World War* (58). The Italians contribute almost nothing, and the other European references tend to derive from the German or French points of view.

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THE GASIOROWSKI BIBLIOGRAPHY OF MILITARY PSYCHOLOGY^{1,2}

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This bibliography is meant "not only for persons specialized in the study of psychology and instructors in the army, but also for all those officers who are interested in science." The author did not attempt to exhaust the field but rather to select those contributions which furnish basic material for further study.

The book, comprising 6382 titles, is arranged according to authors in a main section, 1-5626, and a supplement, 5627-6382. There is no systematic difference between the two parts. Most of the titles are briefly annotated in Polish. There is an introduction and a subject index, each in both Polish and French.

Distribution of the material according to languages and years as given by Gasiorowski is shown in Tables I and II. Forty-two per cent of the titles refer to books, 58% to articles.

Excepting a few earlier items, Gasiorowski begins with the nineteenth-century writings of Napoleon and Clausewitz (the name of the latter still being found frequently in present-day German mili-

TABLE I
DISTRIBUTION OF TITLES ACCORDING TO LANGUAGE

Language	No. of Titles	Per Cent
German	1,838	28.4
French	1,586	24.9
Russian	913	14.4
English	780	12.3
Polish	665	10.5
Italian	308	4.9
Various	292	4.6
Total	6,382	100.0

¹ Gasiorowski, J. *Bibliografia psychologii wojskowej*. Warsaw: Księgarnia Wojskowa, 1938. Pp. xxvi+779.

² A copy of the book, to our knowledge the only one in the United States and Great Britain, is in possession of the Brown University Library. This copy has been supplied with an alphabetical subject index in English, based on Gasiorowski's index. Arrangements have been made whereby positive microfilm copies of the work may be obtained at \$5.00 each by addressing the Photographic Laboratory, Brown University, Providence, Rhode Island.

TABLE II
DISTRIBUTION OF TITLES ACCORDING TO YEAR

Years	No. of Titles	Per Cent
17th & 18th Centuries	18	0.3
1801-1872	76	1.2
1873-1906	570	8.9
1907-1914	763	12.0
1915-1933	4,955	77.6
Total	6,382	100.0

tary psychology). The bibliography ends with the close of 1933.

Gasiorowski classifies the topics dealt with as follows:

- (1) Military psychology proper: psychology of the soldier in peace and war, of the army, of combat, and of war; method of thought of the command;
- (2) Philosophy and sociology of war;
- (3) General (nonmilitary) psychology of related fields: fear, courage, fatigue, honor, mass psychology, educational psychology;
- (4) Psychotechnics and work psychology of military interest;
- (5) Military medicine, mental diseases, war neurosis, aviation medicine;
- (6) Morale;
- (7) Books on war: memoirs, letters, novels describing psychological aspects during combat and war.

In Table III an effort is made to classify the contents according to the sections of the bibliography of the Emergency Committee in Psychology. The basis for this classification was Gasiorowski's subject index, which contains roughly 350 headings and subheadings. The frequency of occurrence of the various types of material was derived by counting the number of entries under the different headings.

An additional indication of the scope of the work may be gained from individual headings in the subject index. Here are some samples:

Association Experiments	Mine Thrower
Boredom	Nostalgia
Camouflage	Parapsychology
Children and War	Range Finding
Climate	Reaction Time
Decorations	Reflex
Desertion	Registration Firing
Flame Thrower	Sex Life
Fraternization in War	Submarines
Gas	Tanks
Japanese Soldier	Typology
Military Horse	Vocational Choice

Finally, without any attempt to do it justice, some glimpses into the body of the bibliography may be given. It contains: a good representation of American World War psychology and its reverberations; basic contributions to German military psychology (not apparent from any index entry); general works on personality and testing, such as those by Allport, Babcock, Lewin; writings by Henri Barbusse, Ernest Hemingway, Mussolini, Pilsudski, Romain Rolland.

Gasiorowski, who was a general in the Polish Army, began his work before the World War, 1914-1918, when he took university courses in psychology. The work was published in 1938 under the sponsorship of the Section of Psychology of the Polish Society of Military Sciences. The Society expressed the hope that this material would do its part "to intensify international collaboration in the field of military psychology."

TABLE III

CORRESPONDENCE BETWEEN SECTIONS OF THE BIBLIOGRAPHY OF THE
EMERGENCY COMMITTEE IN PSYCHOLOGY AND TOPICS OF
GASIOROWSKI'S BIBLIOGRAPHY, AND THEIR
FREQUENCY, AS COMPILED FROM
GASIOROWSKI'S SUBJECT INDEX

Bibliography of the Emergency Committee in Psychology		Gasiorowski's Bibliography	
Sections*	Topics as Compiled From the Subject Index	Number of Index Entries Per Section of Emergency Committee's Bibliogra- phy	Per Topic
2. Army Motor Transport Per- sonnel	Automobile driving	38	38
3. Aviation	Aviation	692	692
4. Classification of Military Person- nel	Experimental psychology, psy- chotechnics, intelligence	991	
	Recruiting & types of soldiers & armies	636	
	Army branches & weapons	598	
	Conduct & history of war & combat	2,490	4,715

* It was not possible to segregate material relevant to Section 13, Rehabilitation. Section 1 is the Introduction.

TABLE III (cont'd)

Bibliography of the Emergency Committee in Psychology		Gasiorowski's Bibliography	
Sections	Topics as Compiled From the Subject Index	Number of Index Entries	
		Per Topic	Section of Emergency Committee's Bibliogra- phy
5. Effects of Certain Drugs on Mental and Motor Effi- ciency	Drugs & alcohol	39	39
6. Fatigue	Work & fatigue, marching, psycho- physiology	616	616
7. German Military Psychology	Soldier, German (primarily World War experiences, training, & sim- ilar material; psychology proper not included)	194	194
8. Morale	Morale, general	756	
	States & attitudes affecting morale	1,412	
	Symbols, equipment, material fac- tors	173	
	Religion	69	
	Law & crime	189	
	Desertion, mutiny	136	
	Leadership	1,132	3,867
9. Motivation and Learning in Re- lation to the Na- tional Emergency	Drill	329	
	Education	714	
	Motivation, discipline	698	
	Thought, attention, memory	294	2,035
10. Perception	Perception	319	319
11. Propaganda Tech- nique and Public Opinion	Propaganda	59	
	Psychology of soldiers of other coun- tries	1,206	1,265
12. Psychological Causes [and Ef- fects] of War	Philosophy & ethics	711	
	Social psychology & sociology	1,013	
	Impressions, effects, memoirs, novels	1,615	
	Military expressions, music, slang	37	3,376
14. War Neuroses	Functional & all other disorders, psychoanalysis, suggestion	1,301	1,301
Total number of index entries, Gasiorowski's Bibliography			18,457

